

# Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 12 Lift 1	Soil Origin: TU-099A SFU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 01/05/2021

Systematic Soil Sample Data: RSY 12 Lift 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	Total <sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.881	0.141	0.331
HPPG-SFU-TU099A-001	1	Systematic	8,862	15,359	0.365	-0.0453	-0.126
HPPG-SFU-TU099A-002	2	Systematic	8,063	15,359	0.323	0.00234	N/A
HPPG-SFU-TU099A-003	3	Systematic	8,419	15,359	0.193	-0.0151	N/A
HPPG-SFU-TU099A-004	4	Systematic	8,181	15,359	0.282	0.0248	N/A
HPPG-SFU-TU099A-005	5	Systematic	8,254	15,359	0.333	0.0343	N/A
HPPG-SFU-TU099A-006	6	Systematic	8,472	15,359	0.294	0.0160	N/A
HPPG-SFU-TU099A-007	7	Systematic	8,291	15,359	0.256	0.00803	N/A
HPPG-SFU-TU099A-008	8	Systematic	8,046	15,359	0.212	-0.0105	N/A
HPPG-SFU-TU099A-009	9	Systematic	8,273	15,359	0.146	-0.0398	N/A
HPPG-SFU-TU099A-010	10	Systematic	8,625	15,359	0.290	-0.0169	N/A
HPPG-SFU-TU099A-011	11	Systematic	8,655	15,359	0.328	-0.0197	-0.0764
HPPG-SFU-TU099A-012	12	Systematic	8,952	15,359	0.136	-0.00711	N/A
HPPG-SFU-TU099A-013	13	Systematic	9,463	15,359	0.253	-0.0280	N/A
HPPG-SFU-TU099A-014	14	Systematic	8,204	15,359	0.177	-0.0463	N/A
HPPG-SFU-TU099A-015	15	Systematic	8,002	15,359	0.269	0.00437	N/A
HPPG-SFU-TU099A-016	16	Systematic	8,275	15,359	-0.0309	-0.0363	N/A
HPPG-SFU-TU099A-017	17	Systematic	8,923	15,359	0.433	0.0000559	N/A
HPPG-SFU-TU099A-018	18	Systematic	8,991	15,359	0.339	0.0209	N/A
HPPG-SFU-TU099A-019	19	Systematic	8,405	15,359	0.333	-0.00116	N/A
HPPG-SFU-TU099A-020	20	Systematic	8,343	15,359	0.152	-0.00139	N/A
HPPG-SFU-TU099A-021	21	Systematic	7,316	15,359	0.210	0.0188	0.0228
HPPG-SFU-TU099A-022	22	Systematic	8,330	15,359	0.222	0.00636	N/A
HPPG-SFU-TU099A-023	23	Systematic	8,551	15,359	0.273	-0.0153	N/A
HPPG-SFU-TU099A-024	24	Systematic	8,014	15,359	0.245	0.00238	N/A
HPPG-SFU-TU099A-025	25	Systematic	8,023	15,359	0.218	-0.0359	N/A
<b>Soil Systematic Sample Statistics</b>					<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	Total <sup>90</sup> Sr Final Analytical Results (pCi/g)
Maximum					0.433	0.0343	0.0228
Mean					0.25	-0.0072	-0.0599
Median					0.256	-0.0014	-0.126
Minimum					-0.0309	-0.0463	-0.0764
Standard Deviation					0.0938	0.0225	N/A

Biased Soil Sample Data: RSY 12 Lift 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	Total <sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.881	0.141	0.331
HPPG-SFU-TU099A-B-001	1	Biased	10,055	15,359	0.265	-0.0378	0.233

CPM Counts per minute

pCi/g Picocuries per gram

\* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-11162020-PG-ROV-309	11/16/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-11192020-PG-JSS-321	11/19/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-11182020-PG-JSS-314	11/18/2020	3x3	10/09/2021	271420
Biased Sample Survey	HPRS-11192020-PG-JSS-323	11/19/2020	3x3	10/09/2021	271420

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 12 Lift 1
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 36 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 36 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-49. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 50-84). Ten percent of the systematic soil samples (three samples in total -001, -011, &amp; -021) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 50-84). Samples HPPG-F-037 and HPPG-F-038 are field duplicates, correlating to systematic samples -014 and -022. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 85-100). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p><b>Conclusions:</b></p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 12 Lift 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-099A SFU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-099.</p>

## Soil Scan Statistics

### Statistical Summary

Dataset	PG-RSY-12-U1				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	27.06	12.44	12.03	3.61
ROI-06	48.11	119.25	82.88	82.18	9.86
ROI-07	35.07	98.22	64.11	64.12	8.55
ROI-08	65.15	152.28	104.70	104.22	11.24
ROI-10	1,812.75	2,488.40	2,139.91	2,140.65	100.78

### Statistical Summary Reference Background

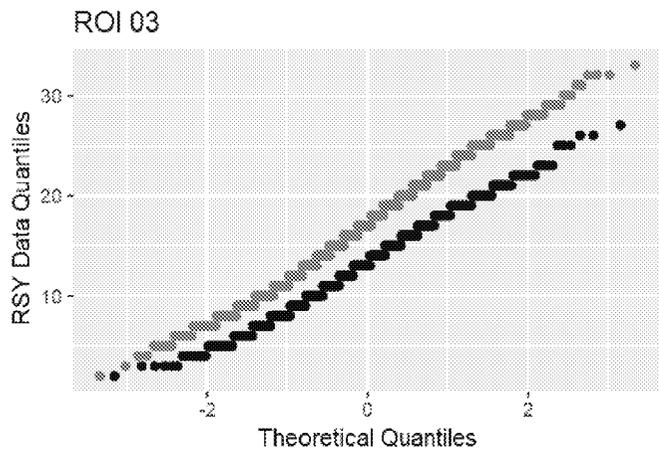
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

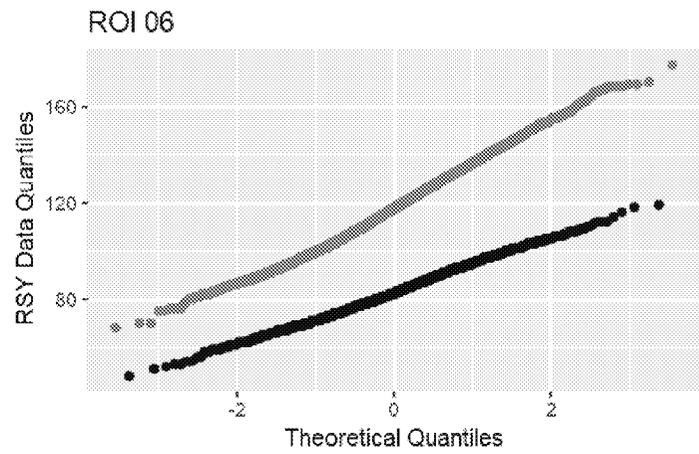
Dataset	Number of Data Points
PG-RSY-12-U1	2531
Scan RBA (Bldg 809)	4632

# Soil Scan Statistics

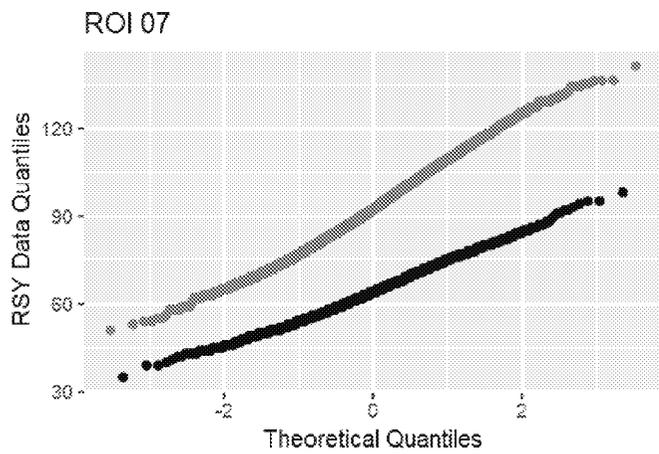
## Normal Q-Q Plots



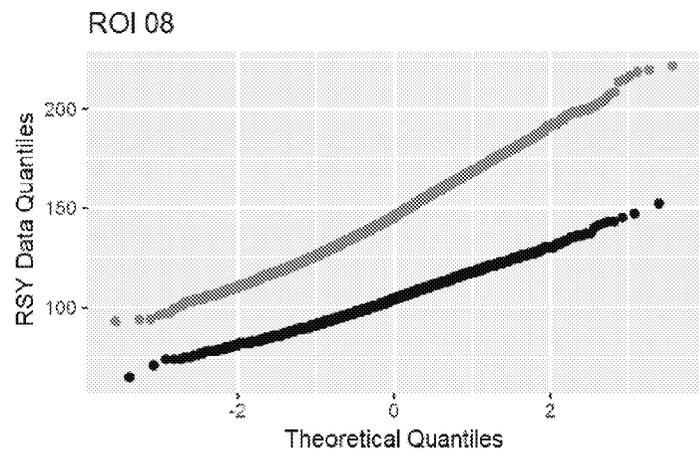
● PG-RSY-12-U1 \* Scan RBA (Bldg 809)



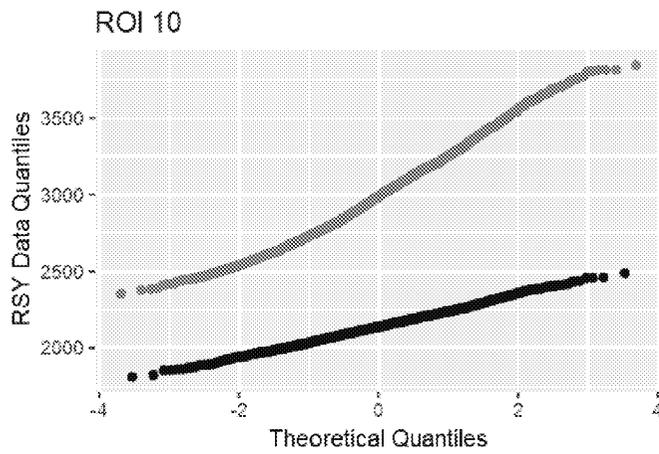
● PG-RSY-12-U1 \* Scan RBA (Bldg 809)



● PG-RSY-12-U1 \* Scan RBA (Bldg 809)



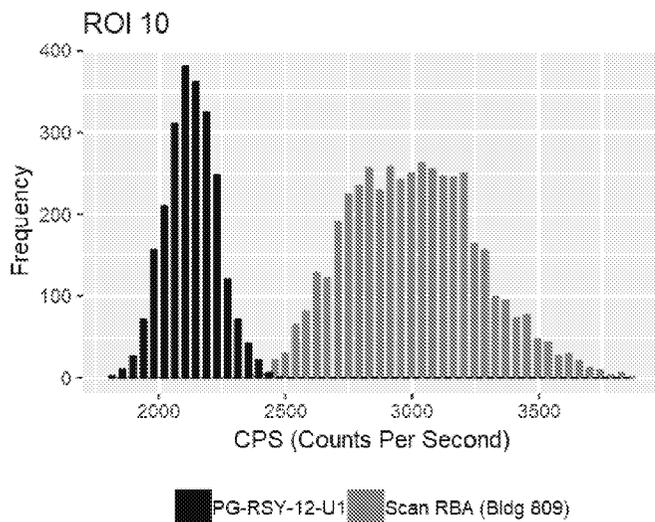
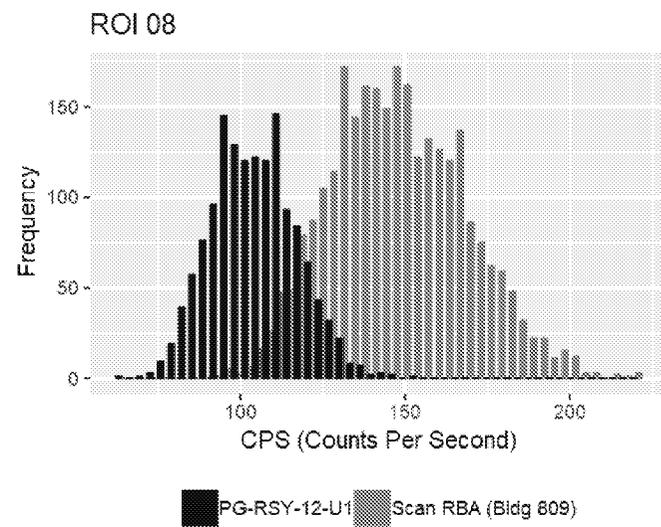
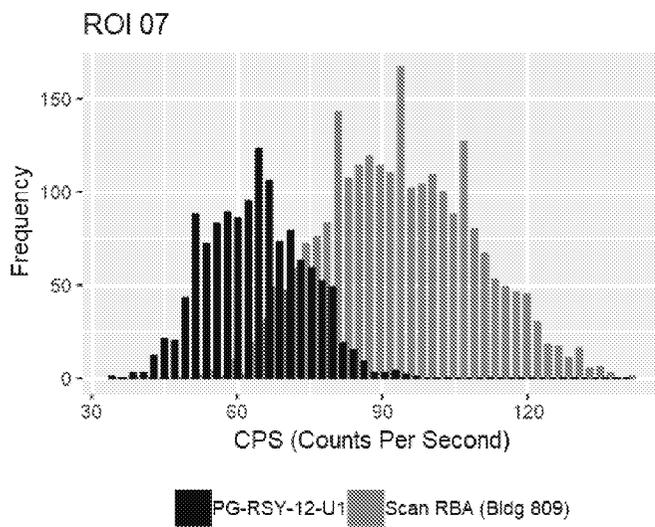
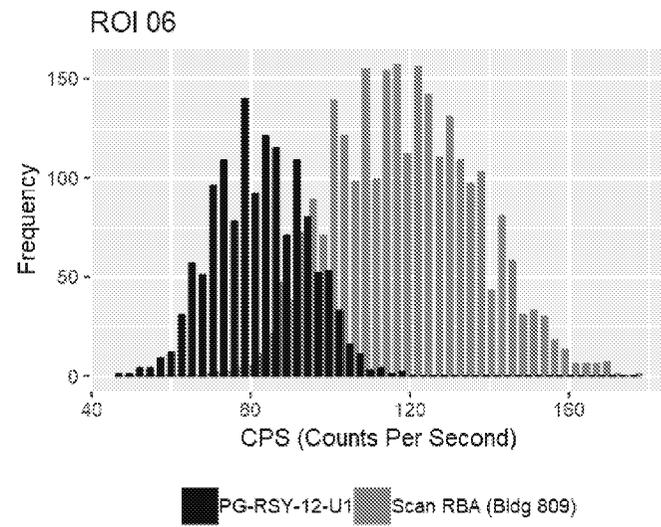
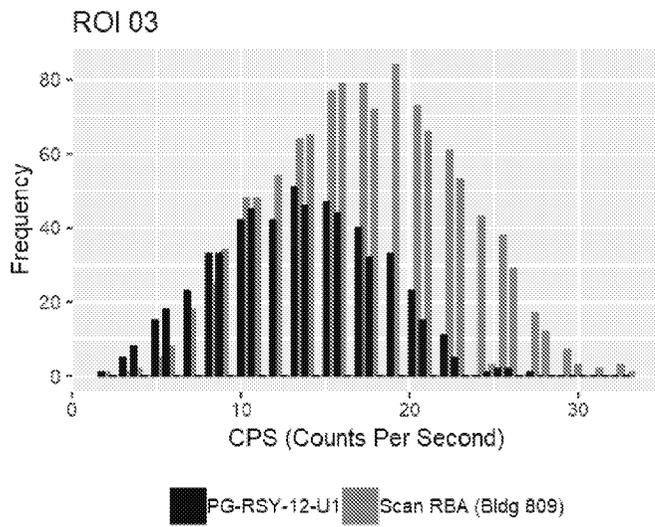
● PG-RSY-12-U1 \* Scan RBA (Bldg 809)



● PG-RSY-12-U1 \* Scan RBA (Bldg 809)

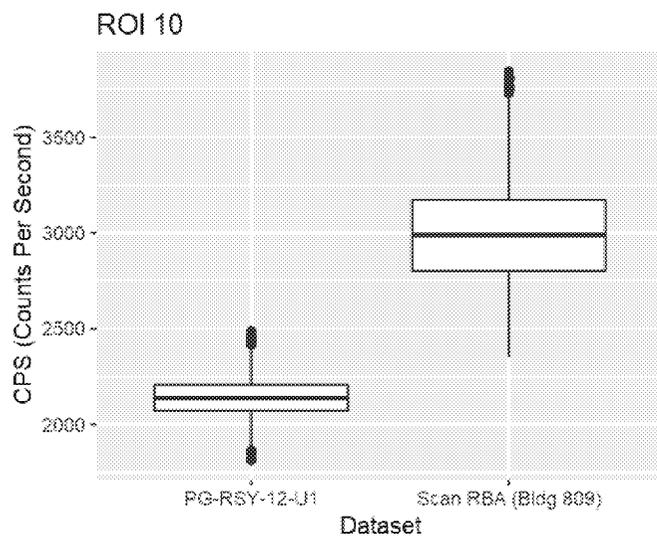
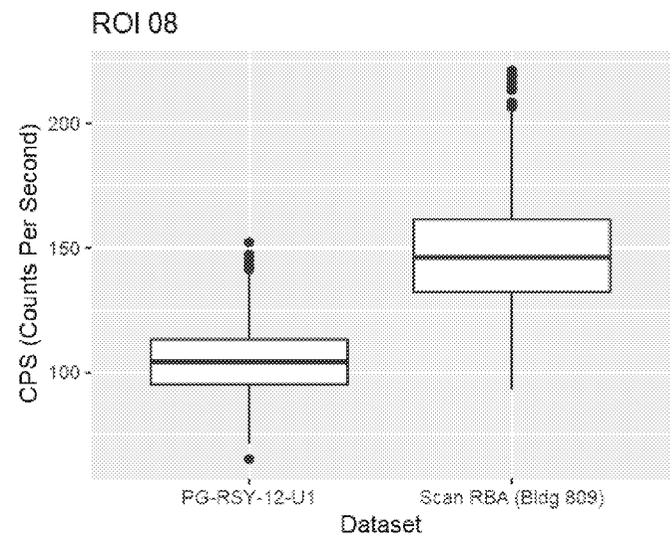
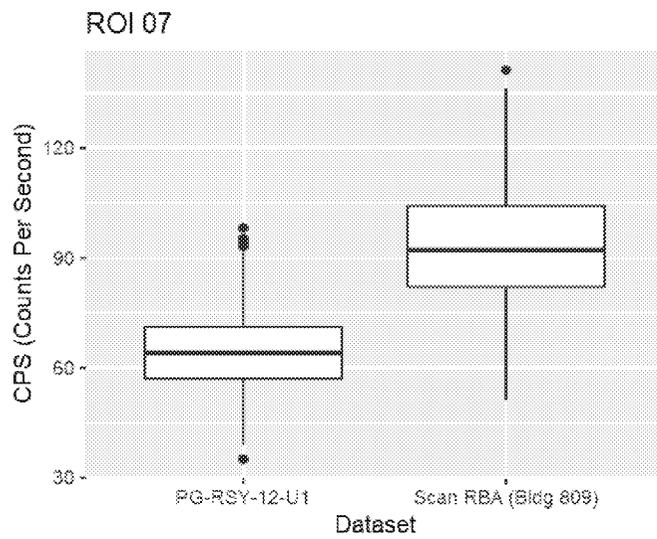
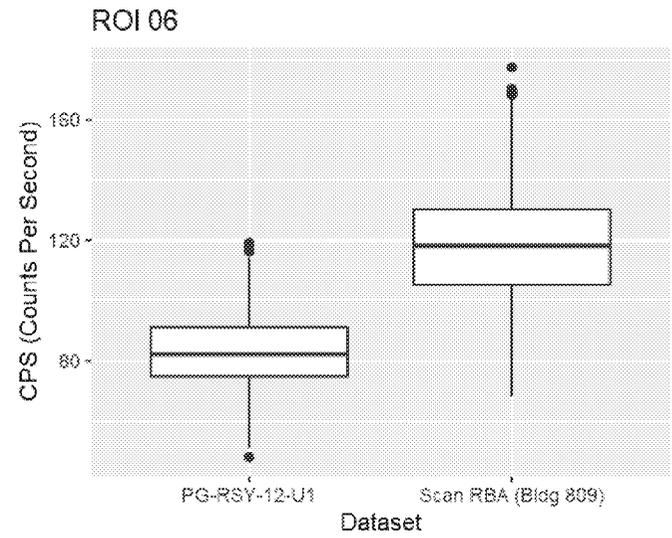
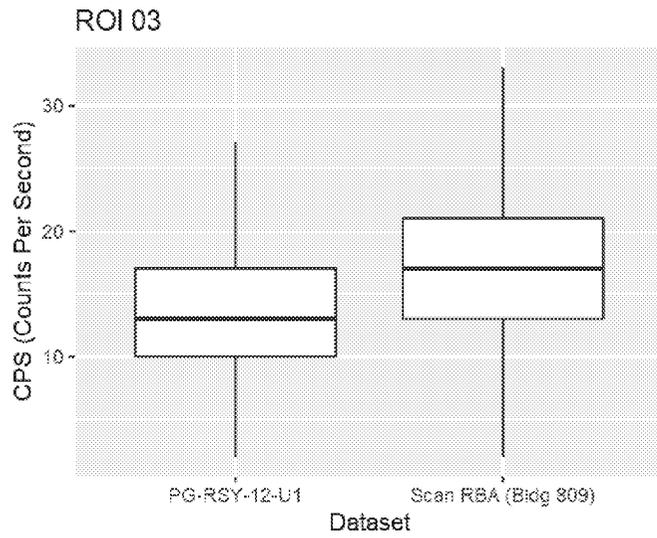
# Soil Scan Statistics

## Histograms



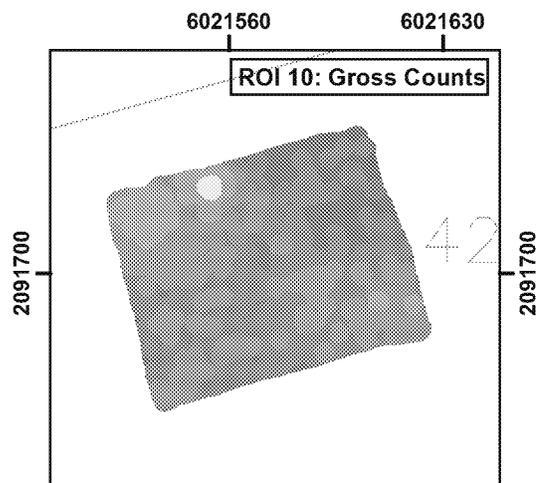
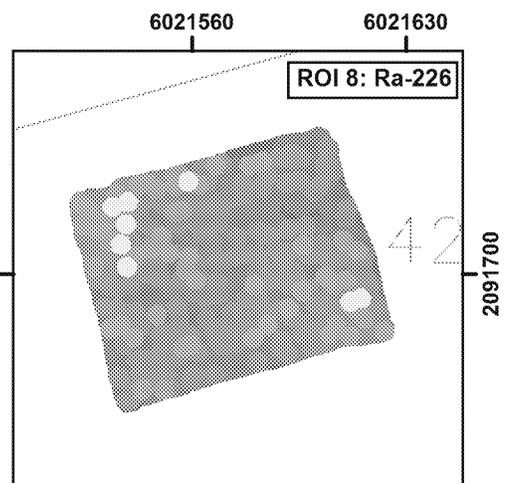
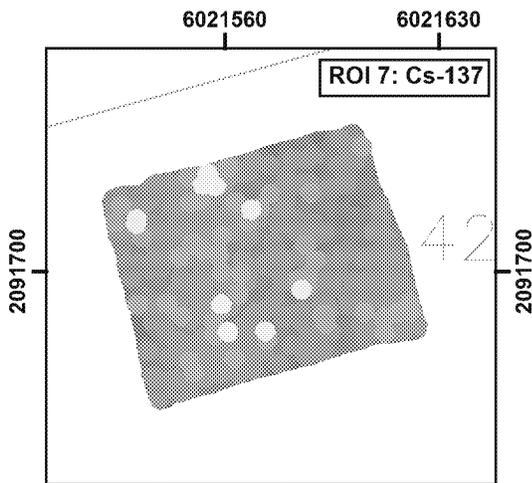
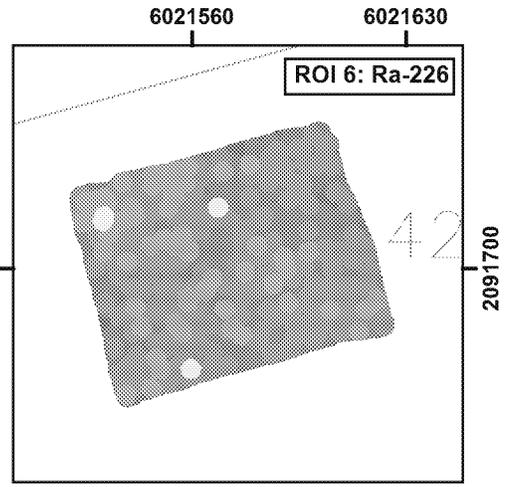
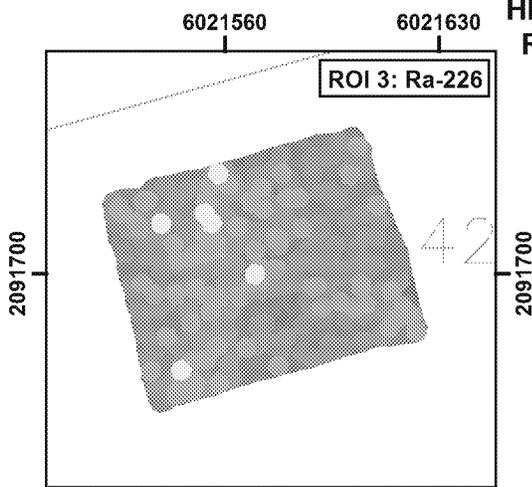
# Soil Scan Statistics

## Box Plots



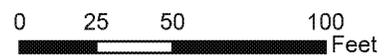
**RSI Data Plots  
HPNS Parcel G  
RSY 12 Use 1**

TU-099A SFU

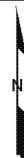


**RS 700 Gamma Walkover Survey Data (VD1)**

- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev

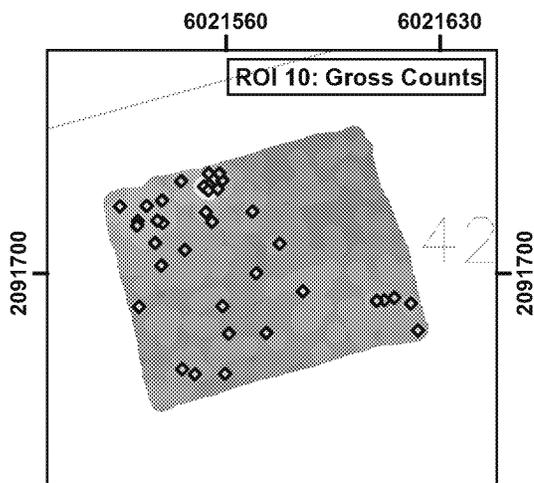
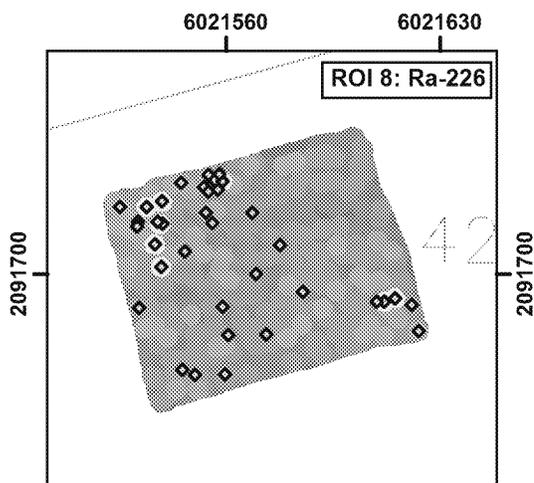
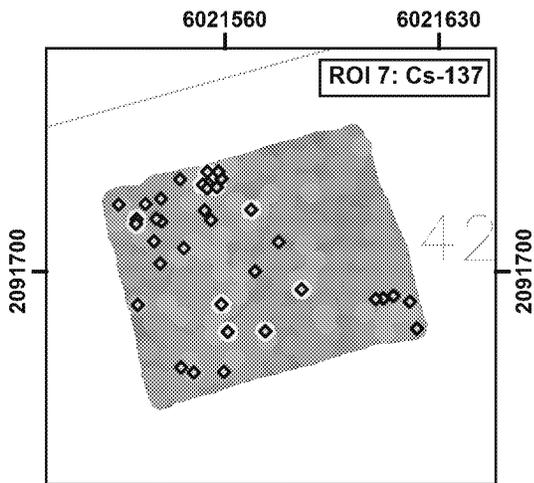
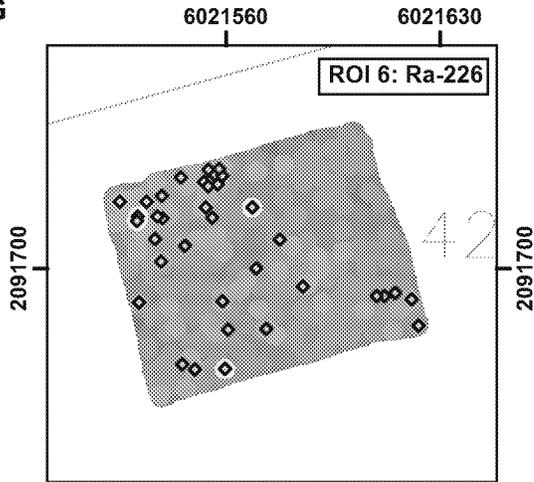
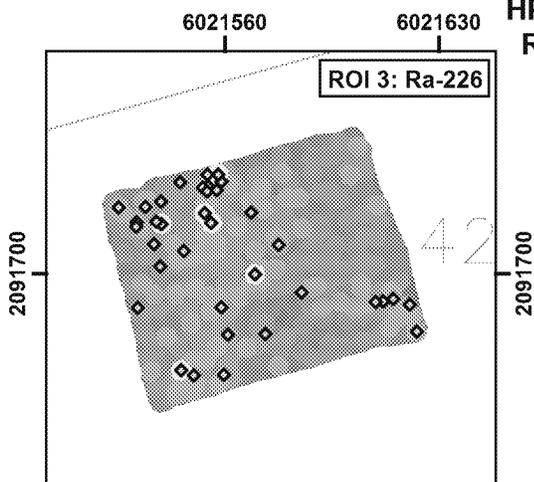


Coordinate system: CSP Zone III, NAD83, US Survey Foot



**RSI Data Plots  
HPNS Parcel G  
RSY 12 Use 1**

TU-099A SFU



**RS 700 Gamma Walkover Survey Data (VD1)**

◆ Follow-Up Locations	● > -1 to < 0 std dev
● > 3 std dev	● > -2 to < -1 std dev
● > 2 to < 3 std dev	● > -3 to < -2 std dev
● > 1 to < 2 std dev	● < -3 std dev
● > 0 to < 1 std dev	

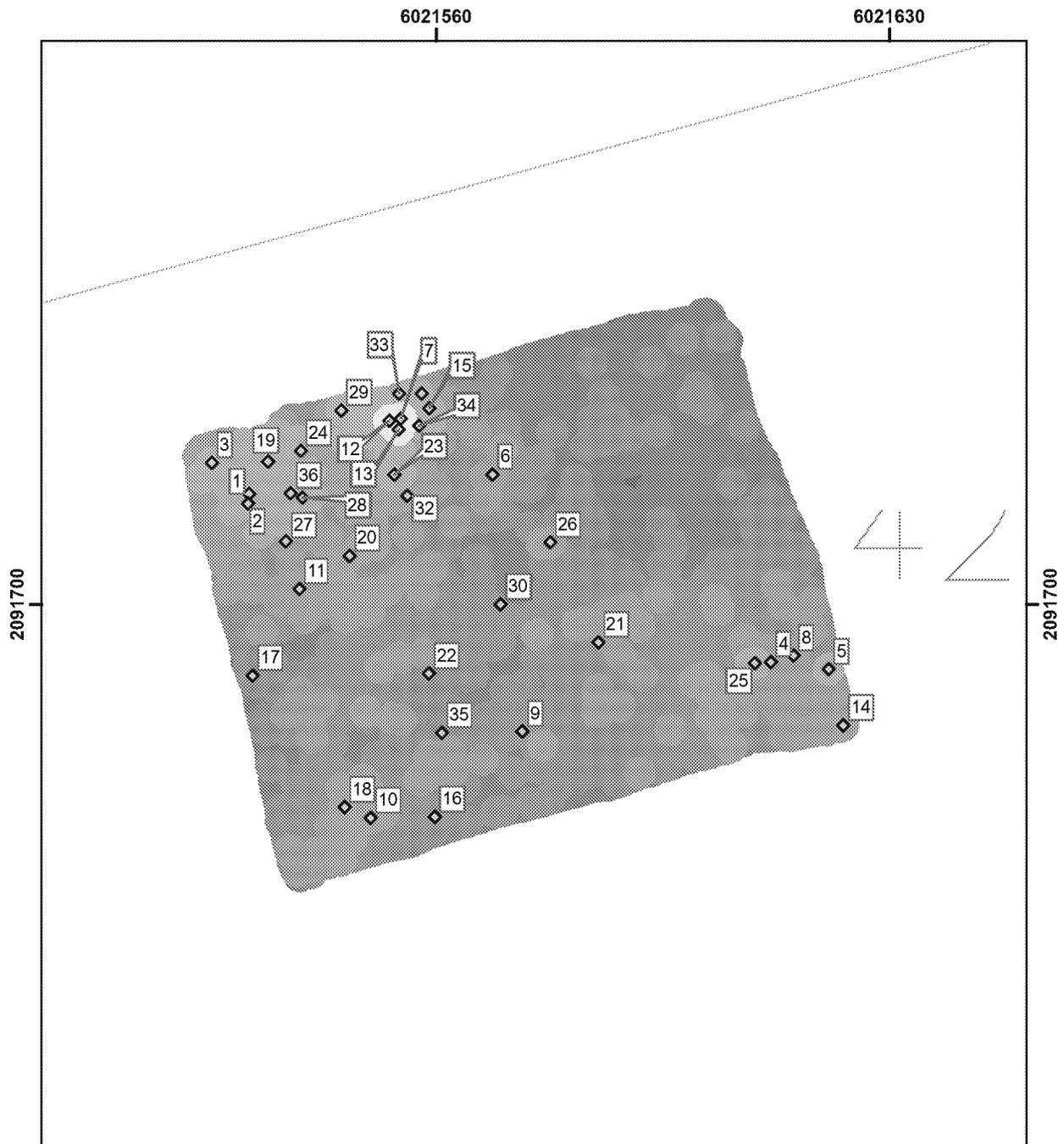
0 25 50 100 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

F:\Radiological\Parcel G\RSY 12\Use 1\HPNSPG\_RSY12\_Use1ContourMaps.mxd

### Follow-Up Static Survey HPNS Parcel G RSY 12 Use 1

TU-099A SFU



**RSY 12 Use 1 (VD1, ROI 10 Gross Gamma)**

◆ Follow-Up Locations	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

25 12.5 0 25 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

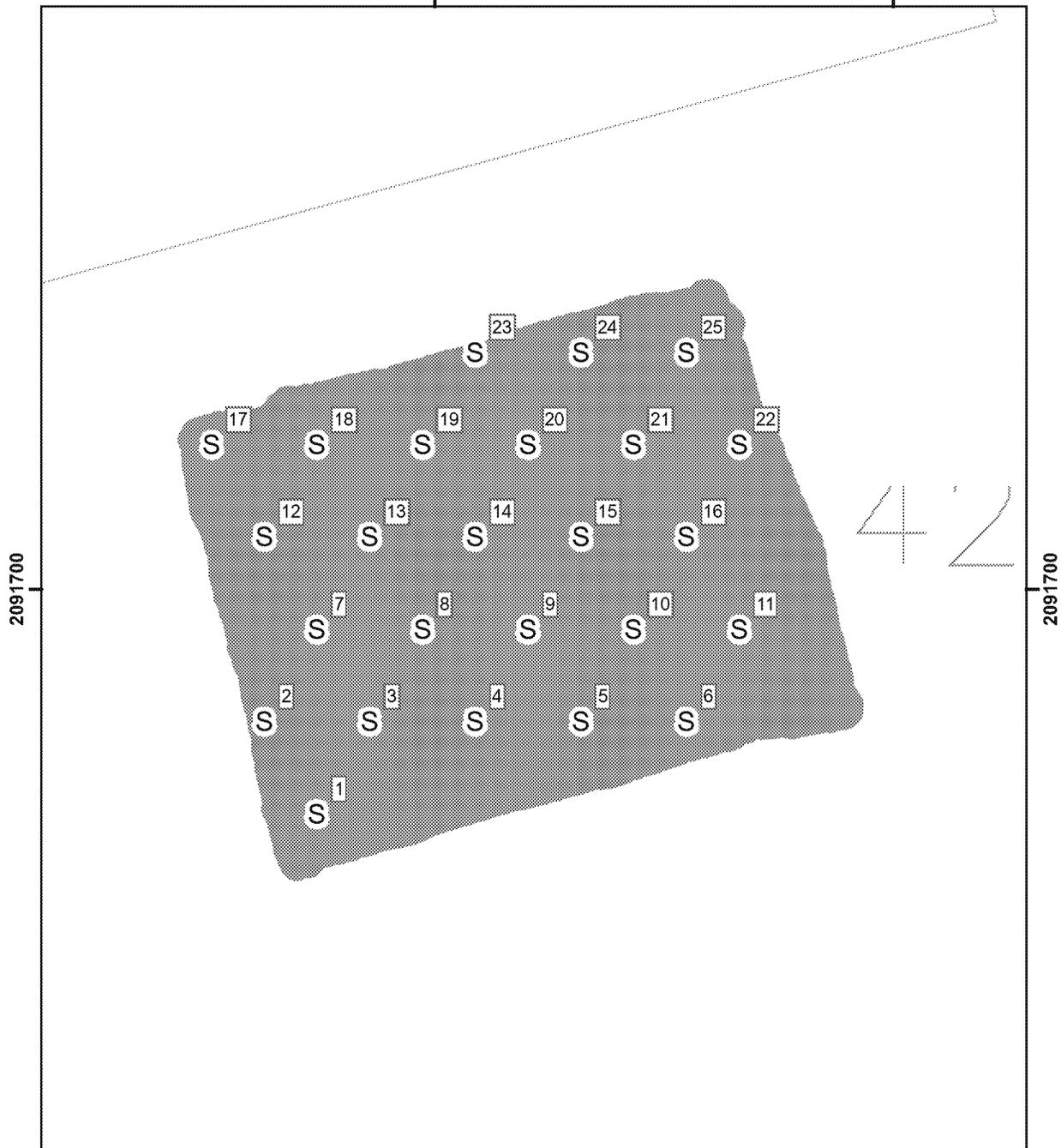
F:\Radiological\Parcel G\RSY 12\Use 1\HPNSPG\_RSY12\_Use1FollowupMaps.mxd

**Systematic Sampling  
HPNS Parcel G  
RSY 12 Use 1**

TU-099A SFU

6021560

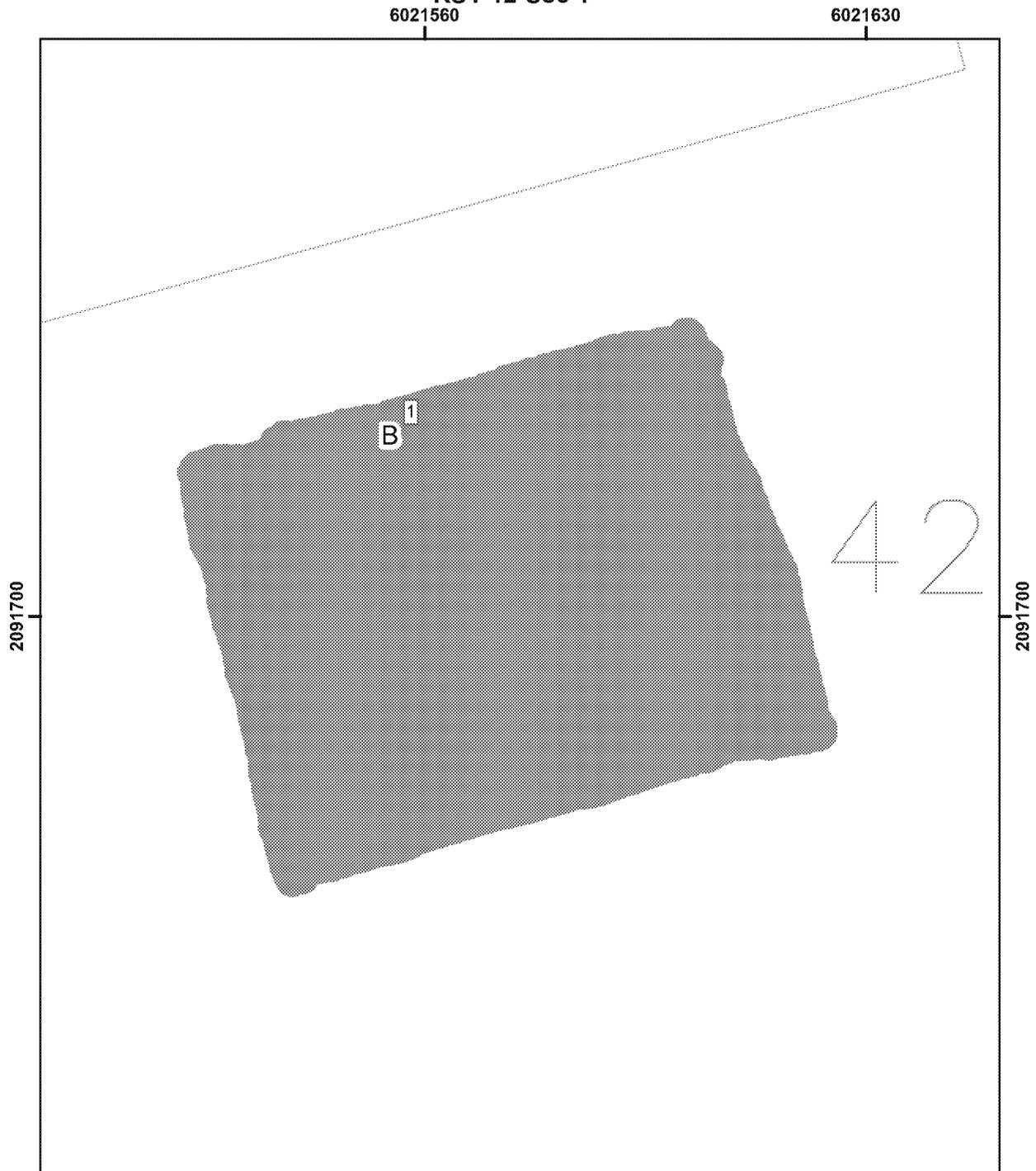
6021630



<p><b>RS 700 Gamma Walkover Survey Data (VD1)</b></p> <ul style="list-style-type: none"><li>S Systematic Sample Locations</li><li>● RS-700 GWS Coverage</li></ul>	<p>0 10 20 40 Feet</p> <p>Coordinate system: CSP Zone III, NAD83, US Survey Foot</p> 
---	---

**Biased Sampling  
HPNS Parcel G  
RSY 12 Use 1**

TU-099A SFU



**RSY 12 Use 1**

- B** Biased Sample Location
-  RS-700 GWS Coverage

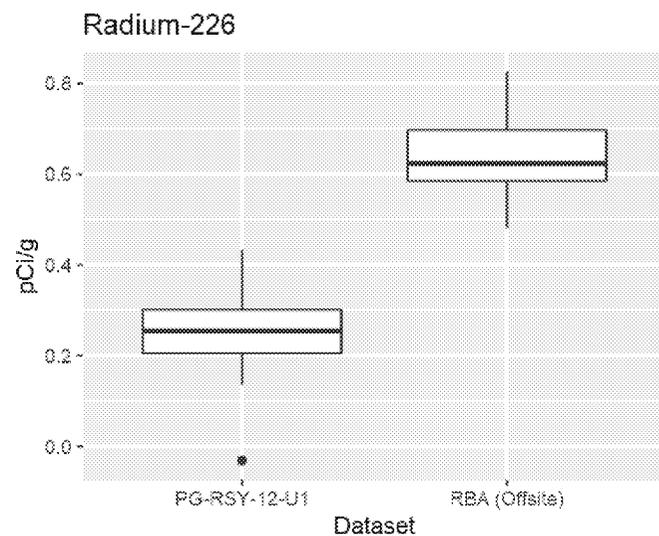
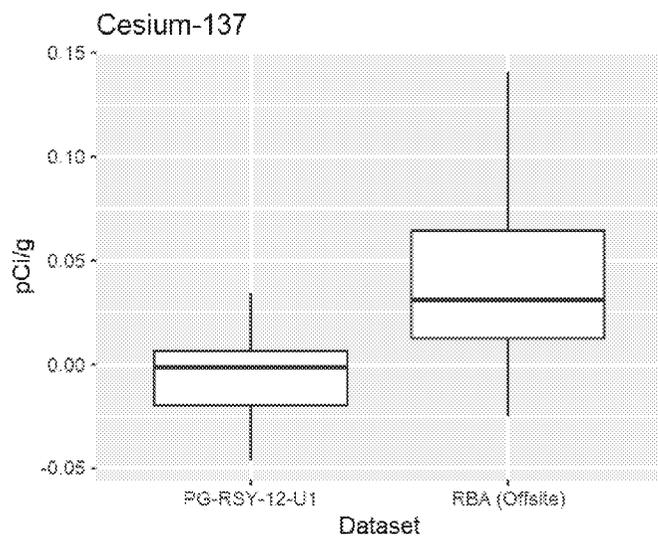
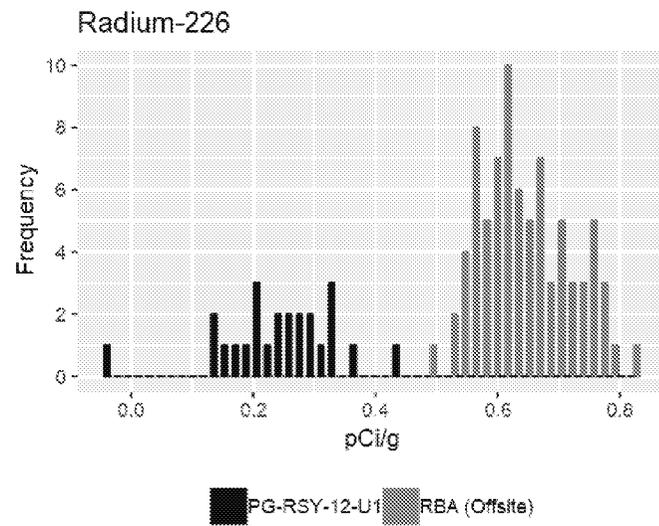
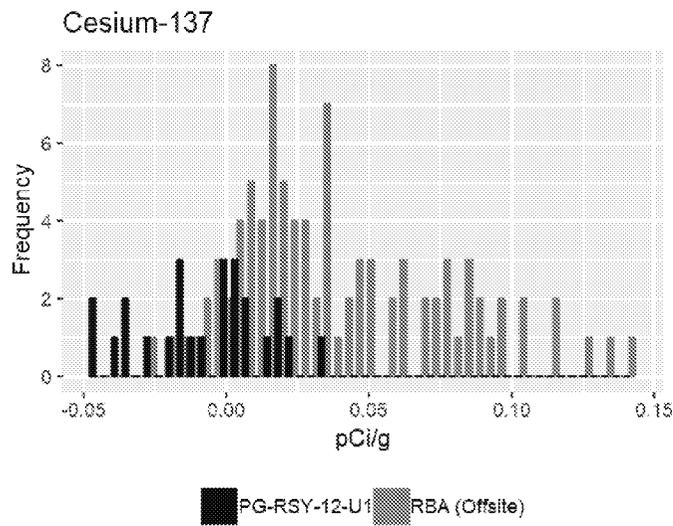
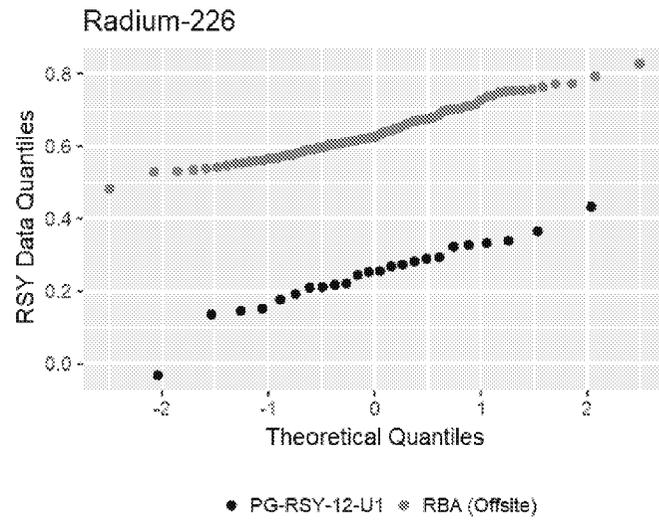
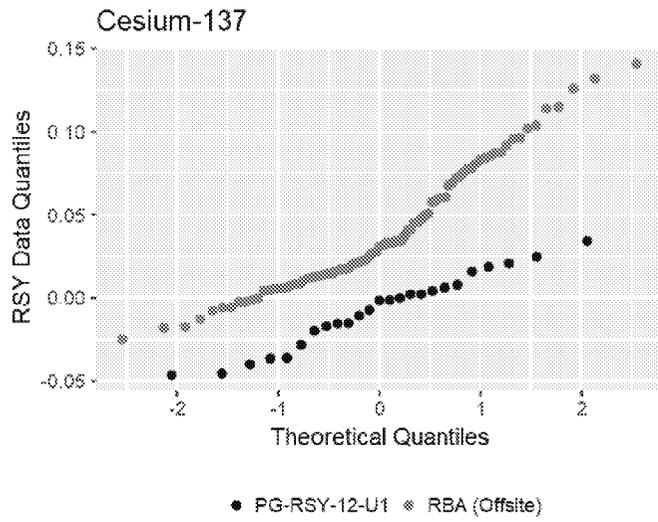
25 12.5 0 25 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

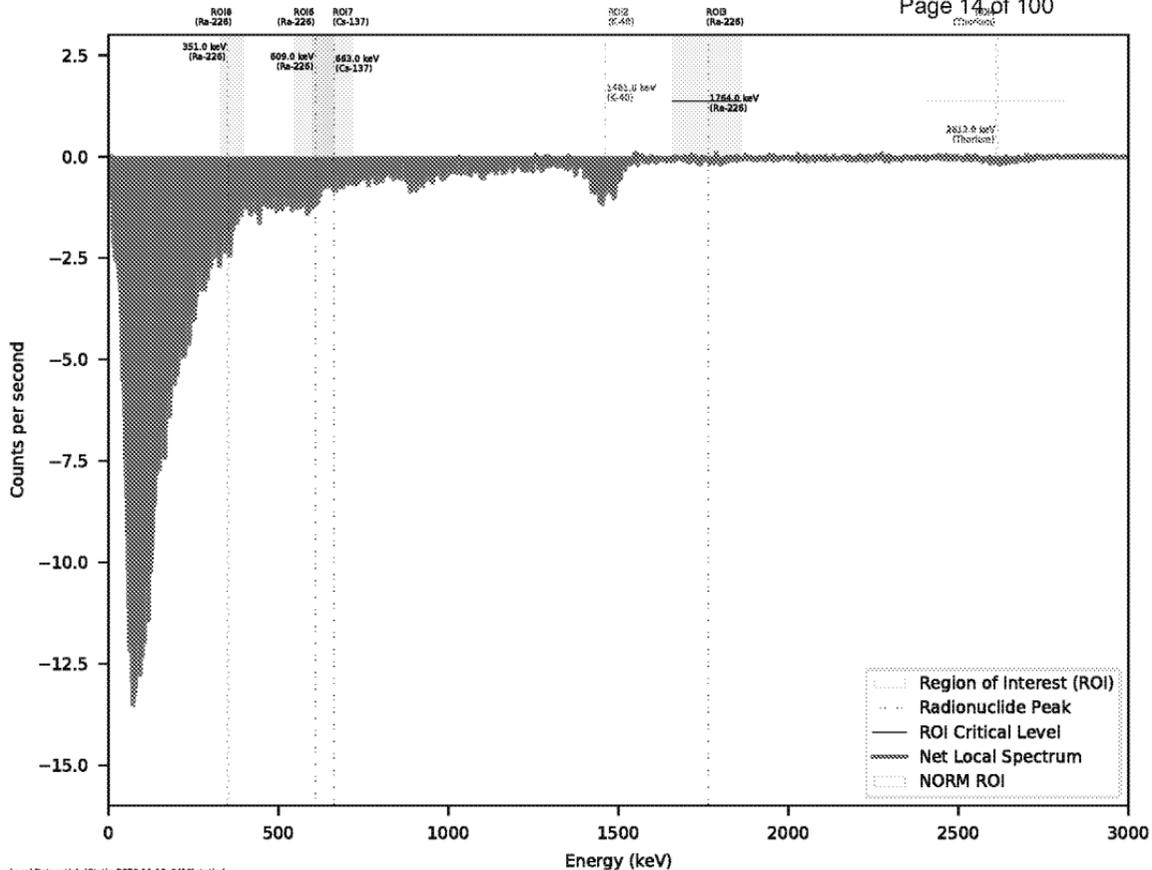


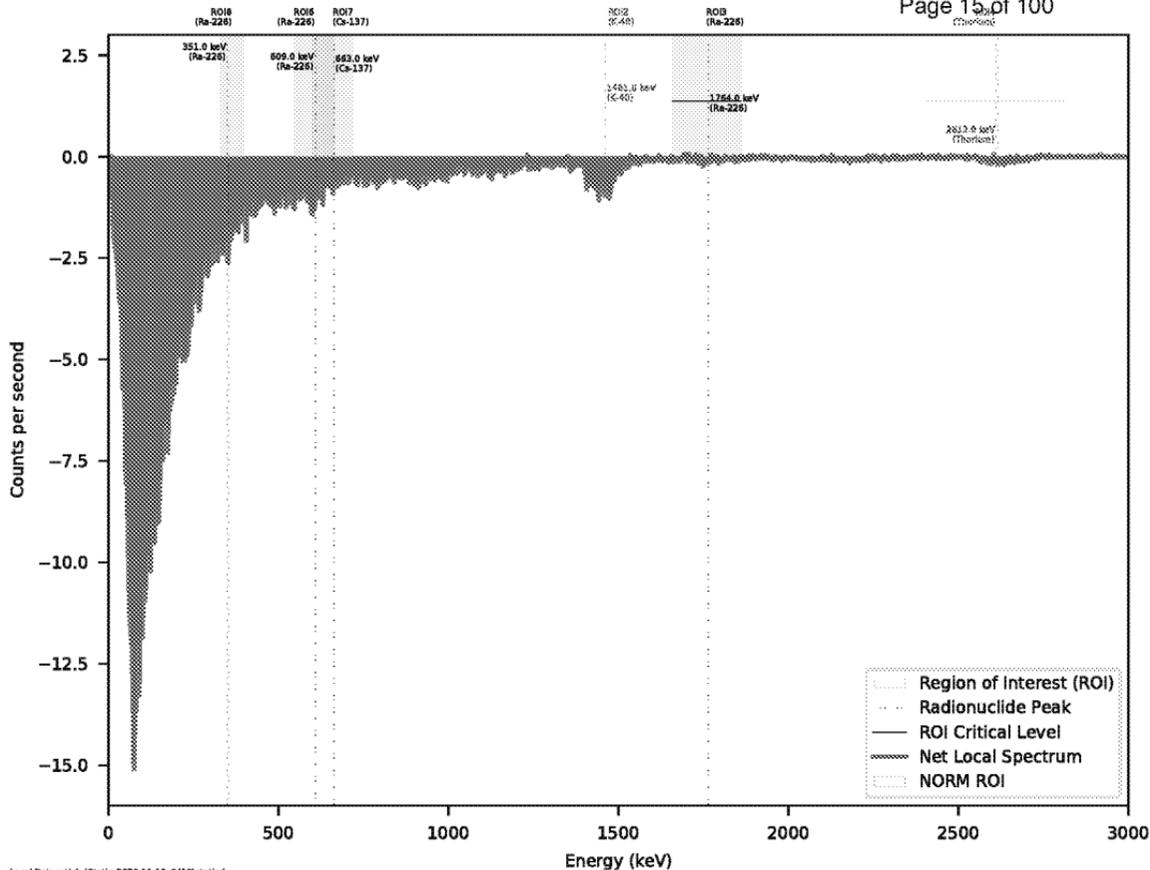
**APTIM**

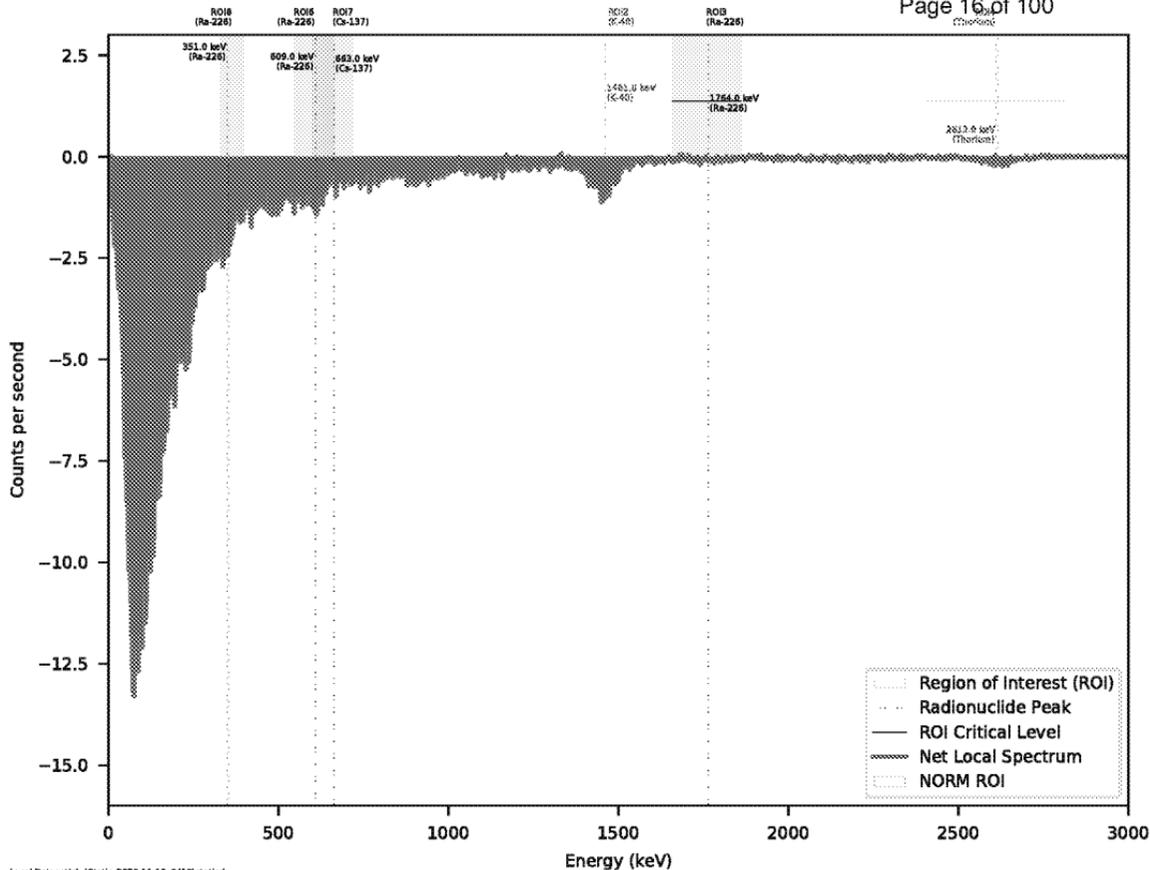
# Soil Sample Statistics

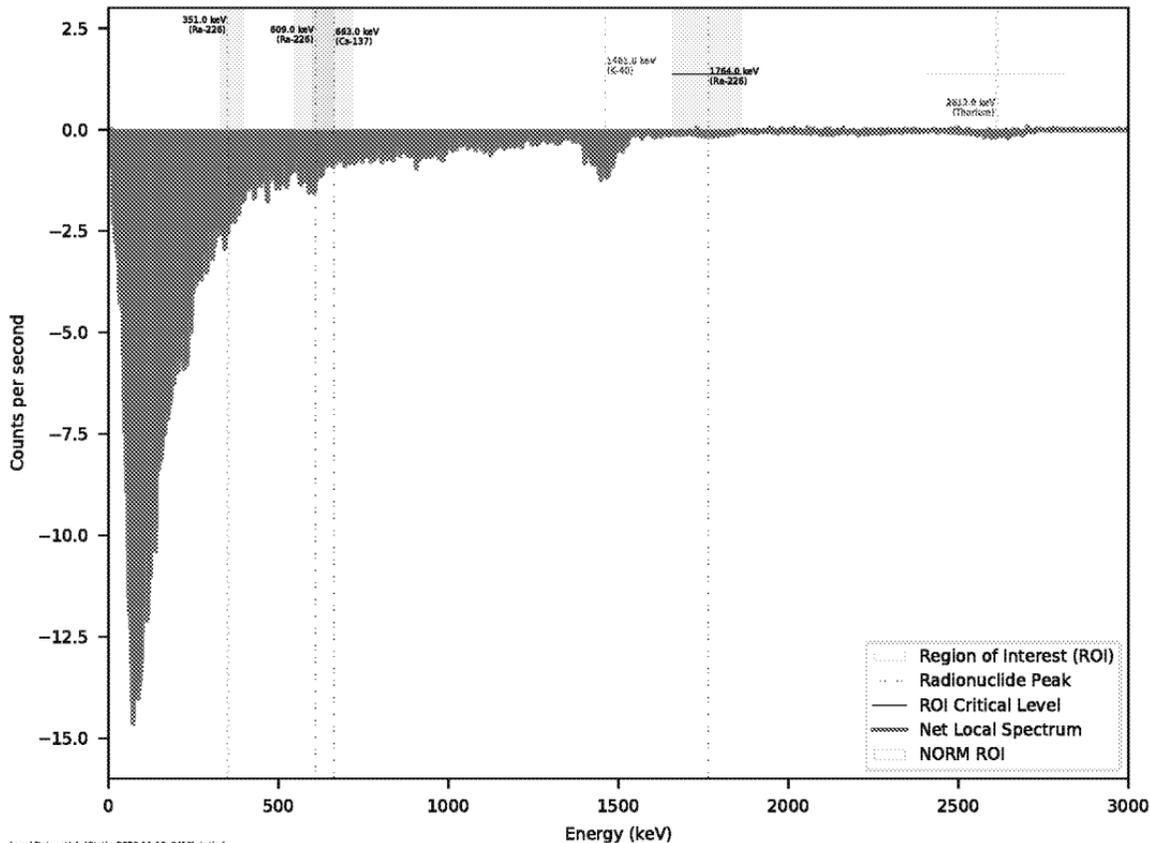


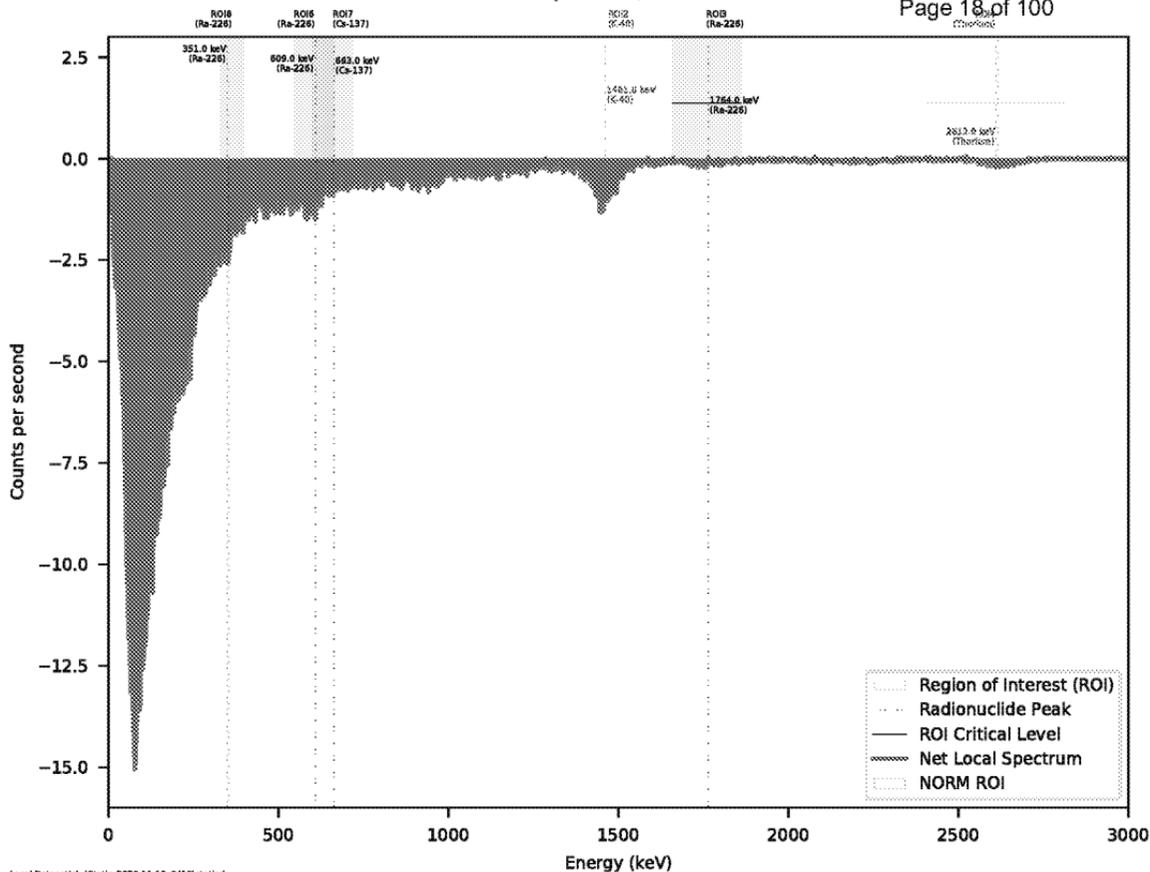


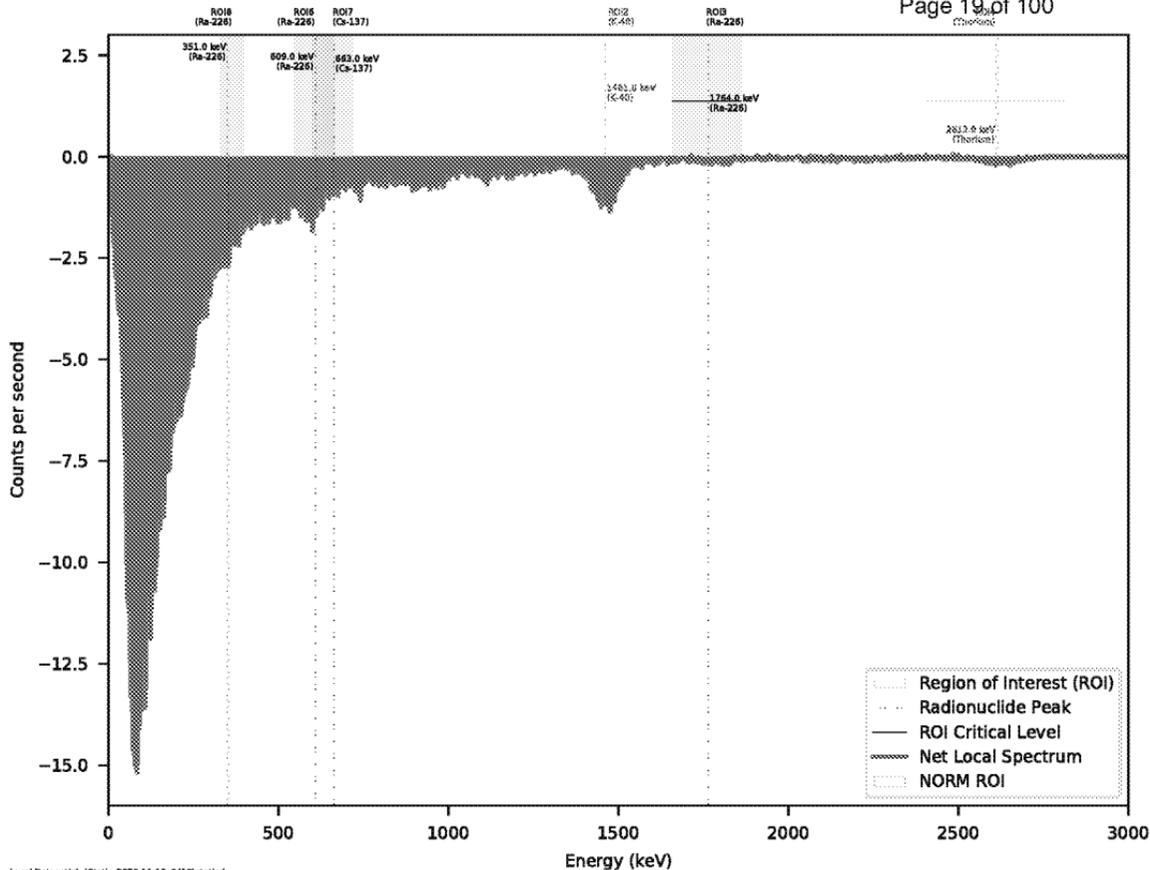


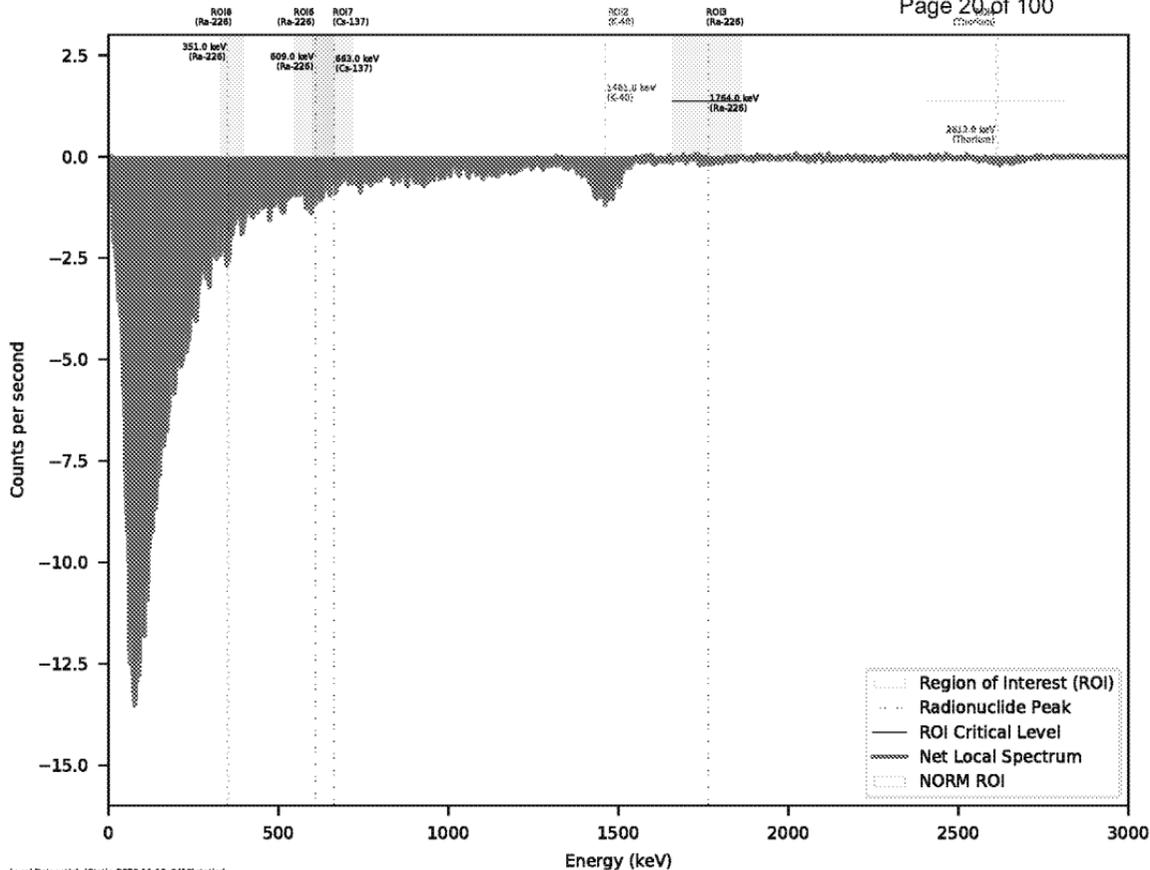


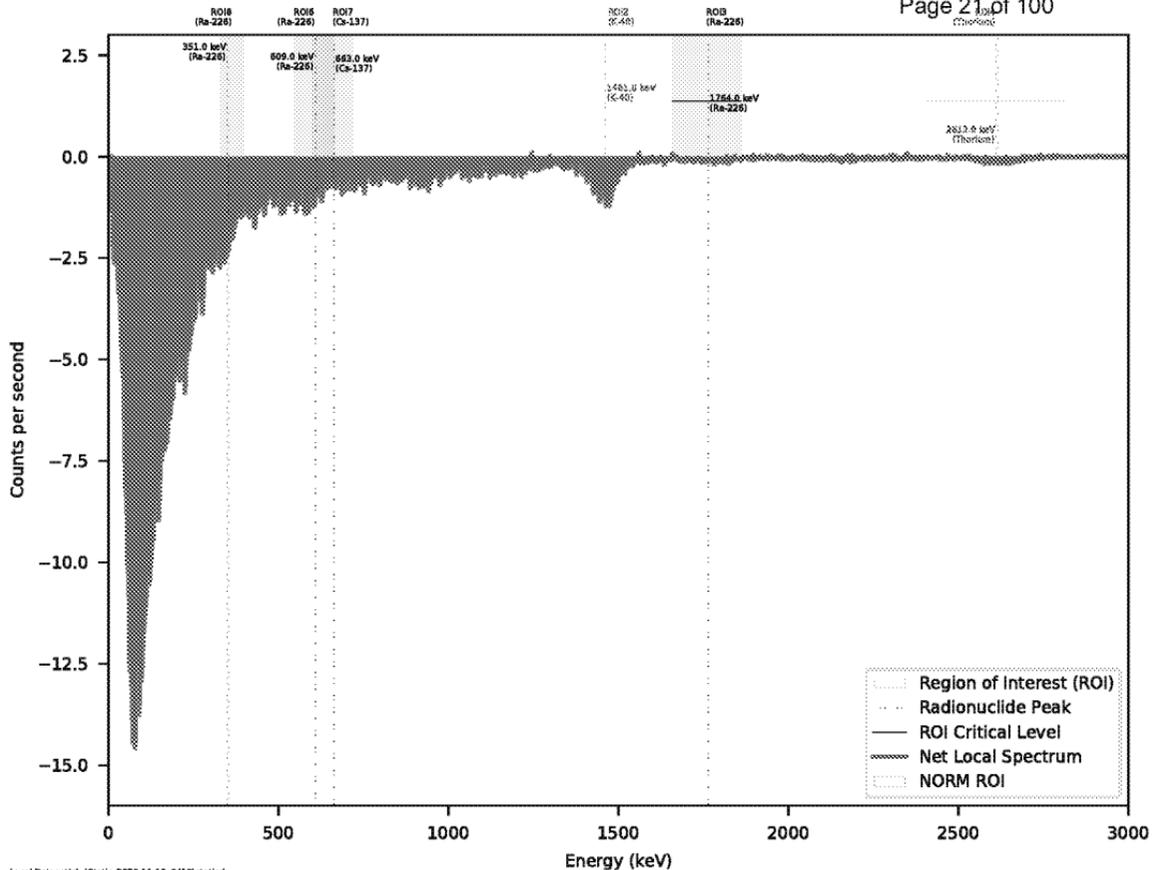


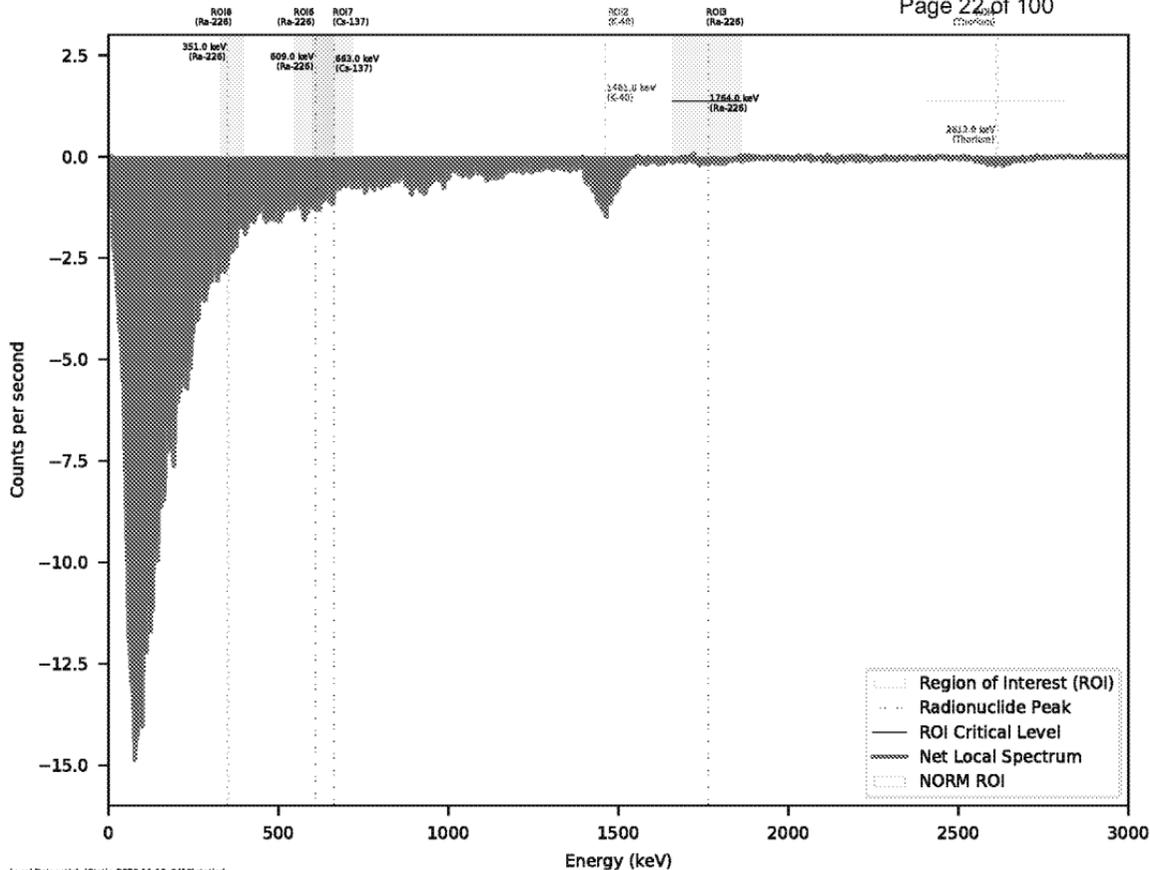


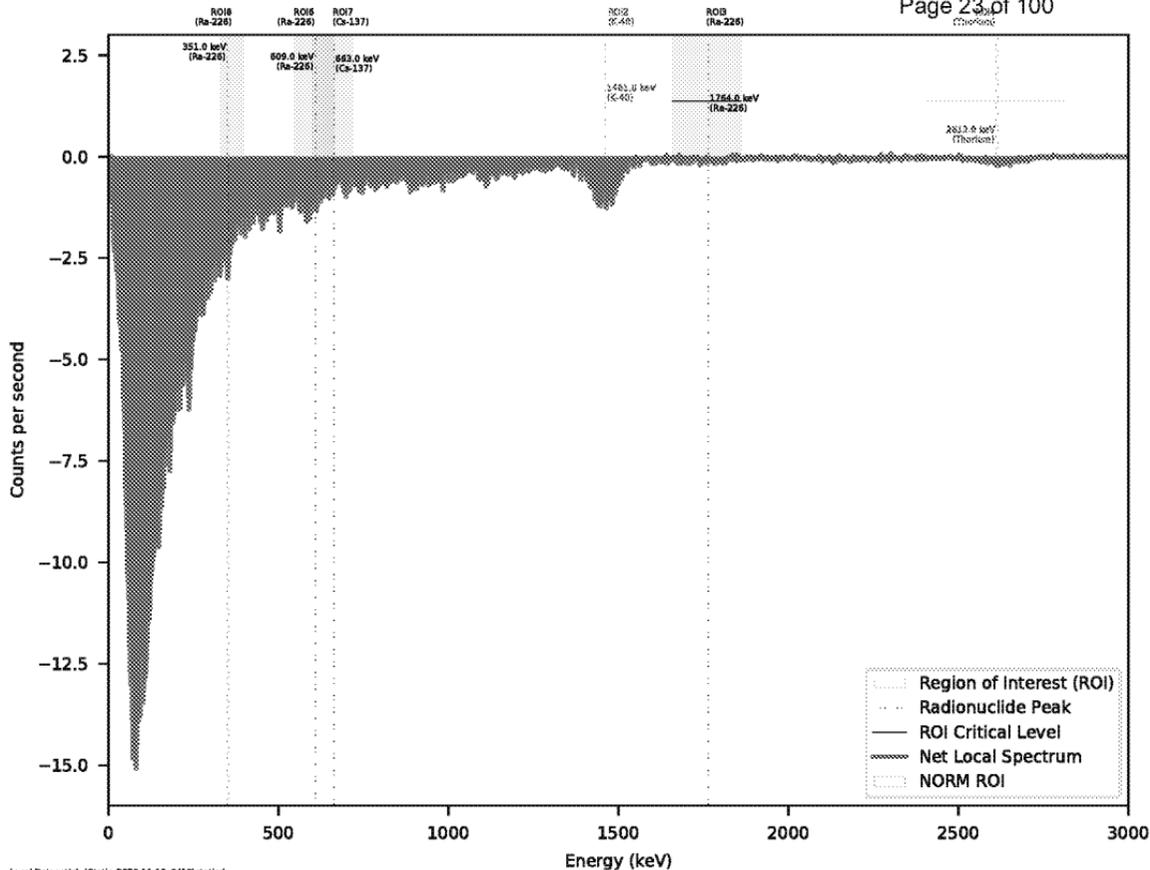


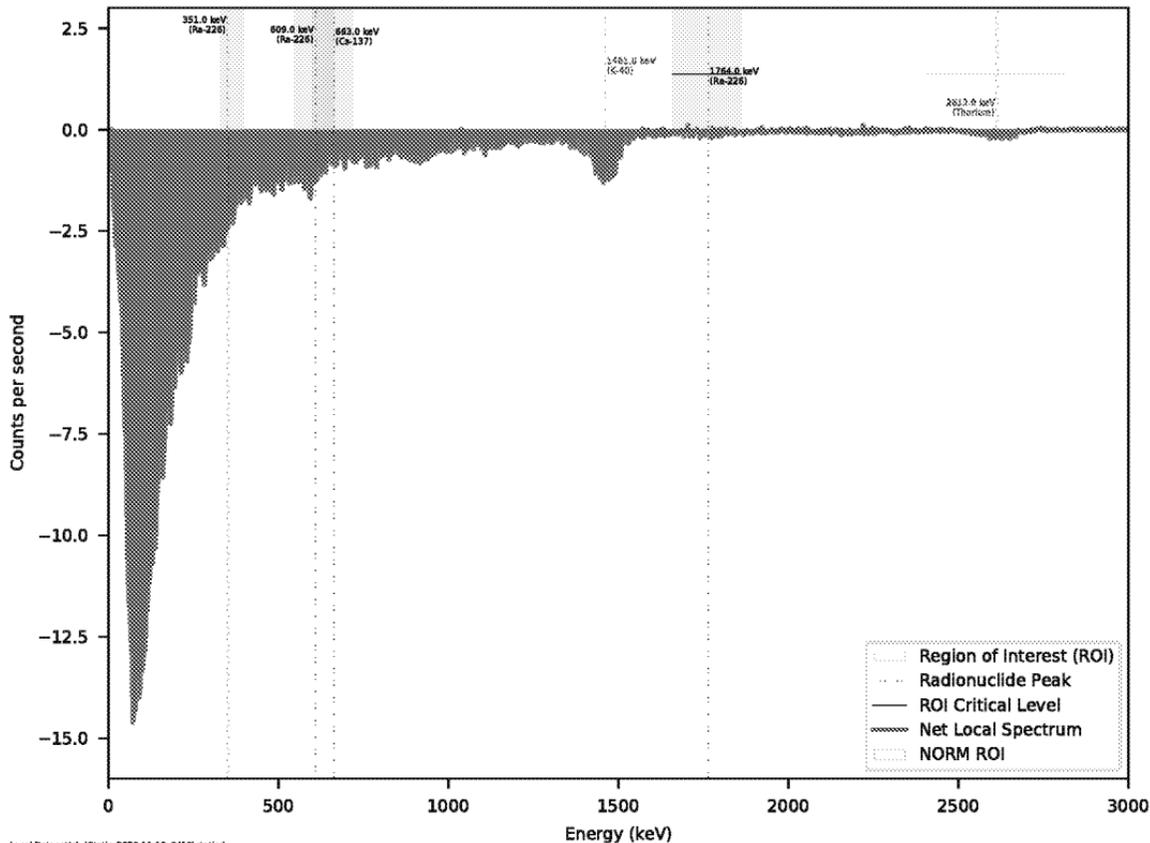


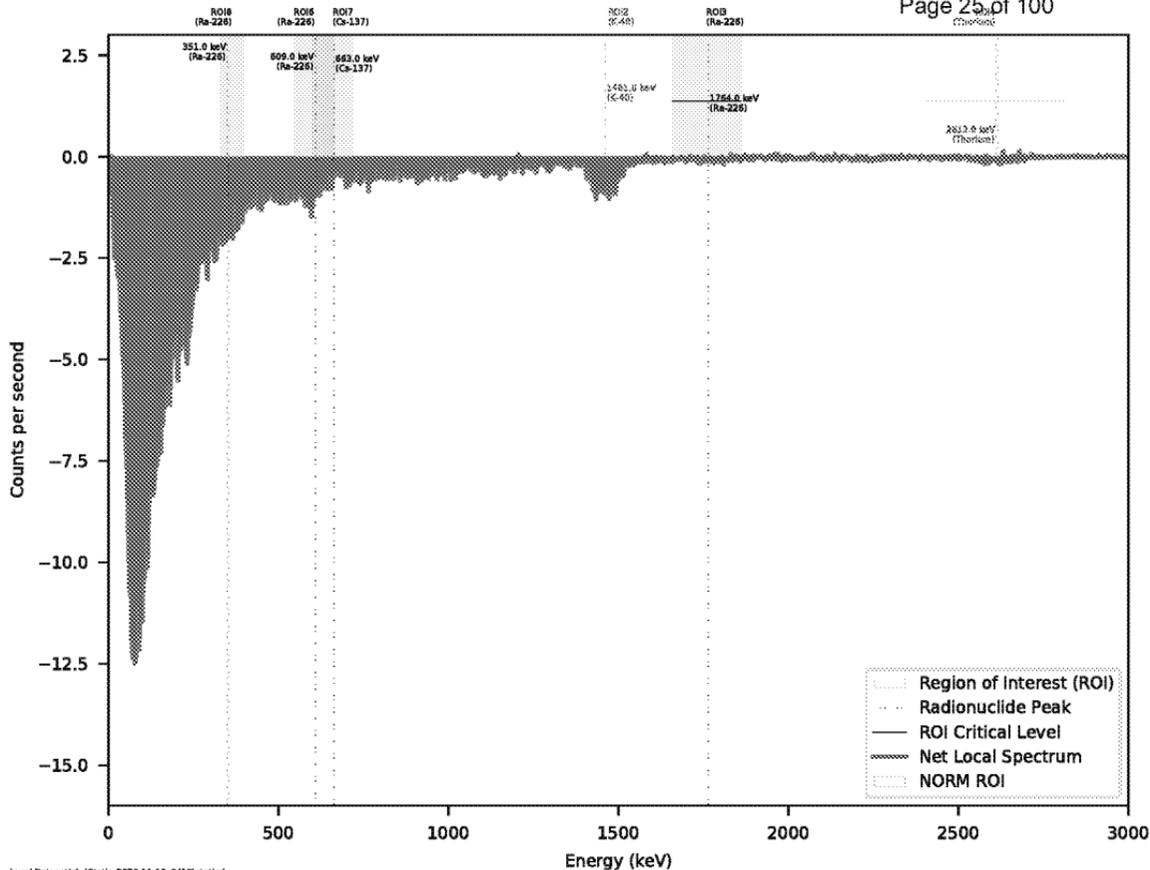




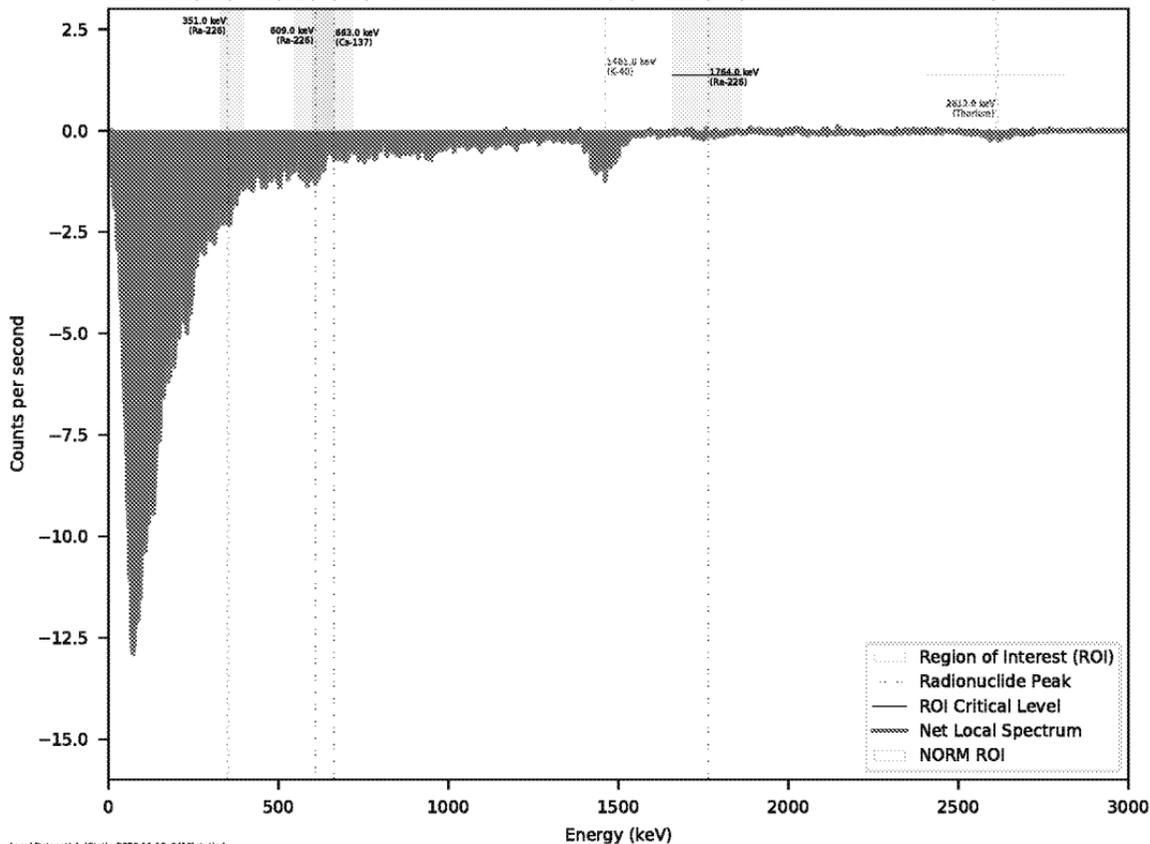




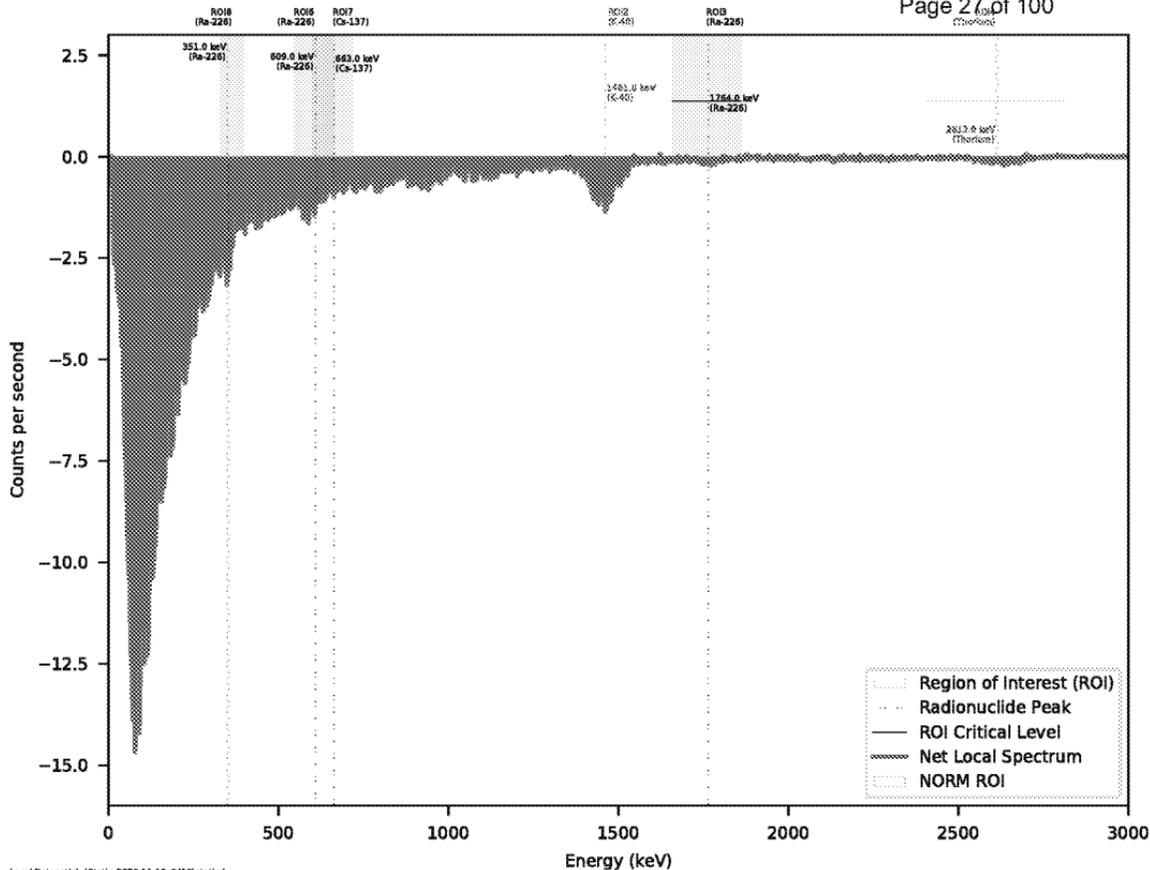


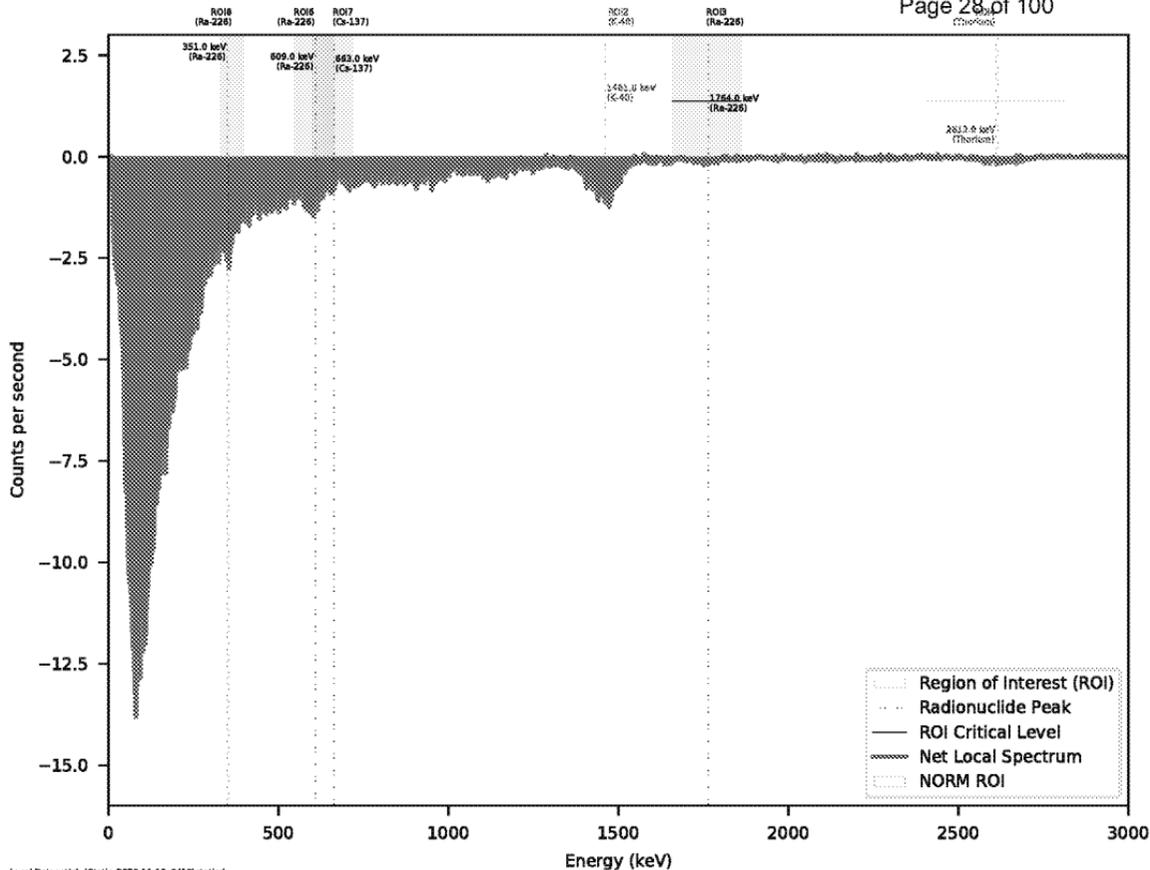


# Net Gamma Spectrum, Static Location: 13

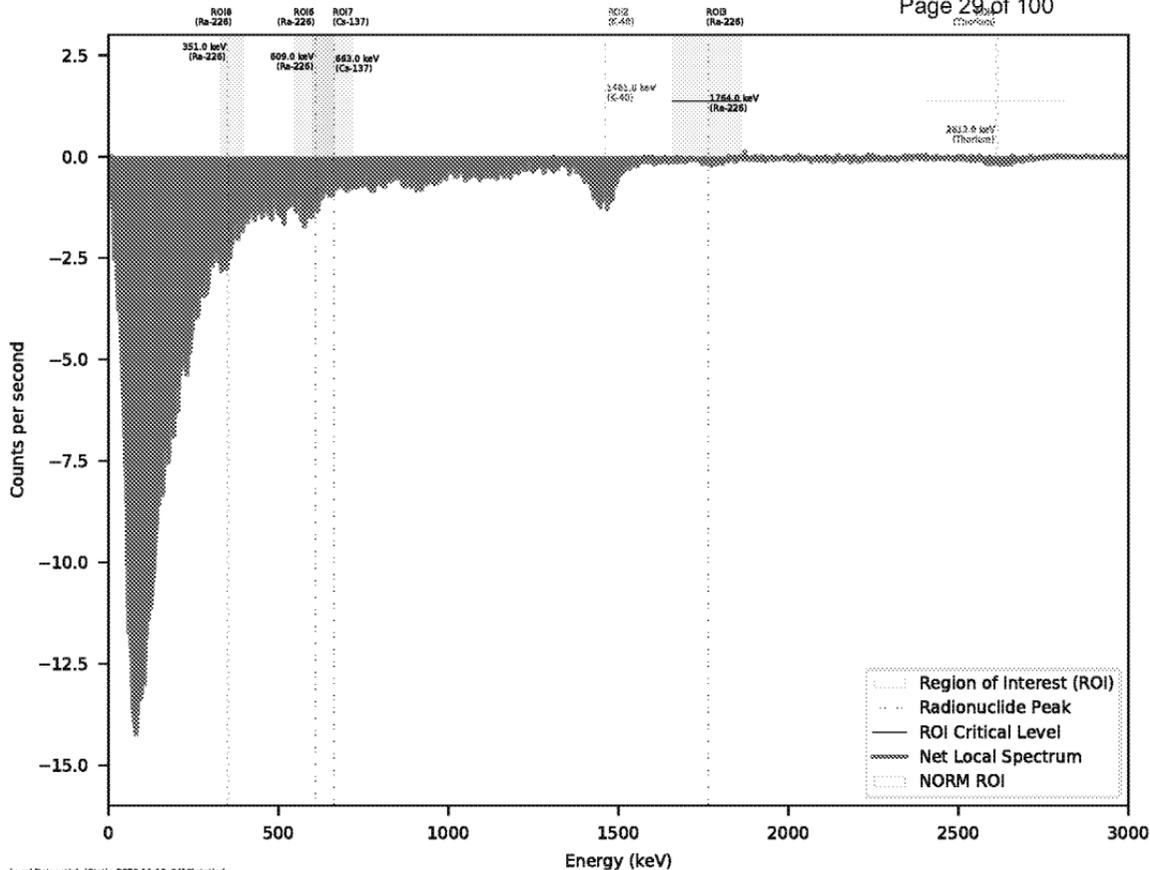


# Net Gamma Spectrum, Static Location: 14

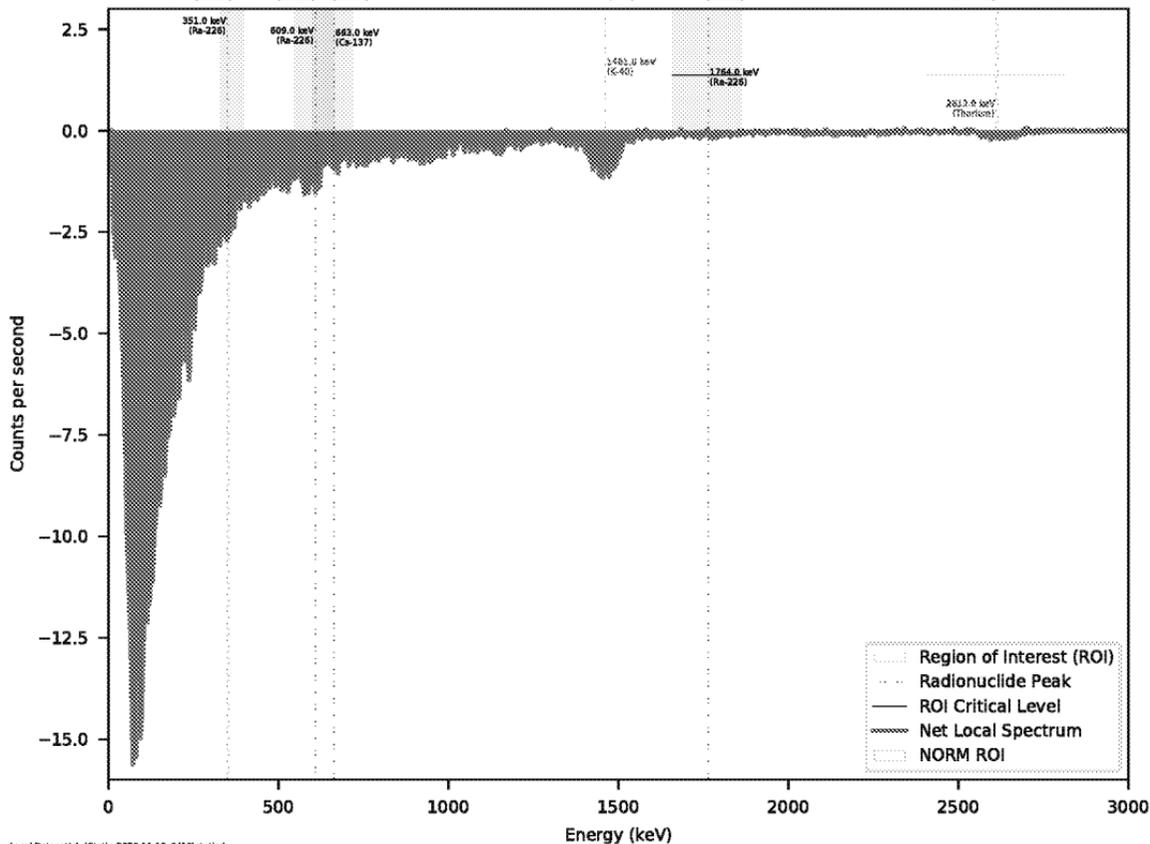




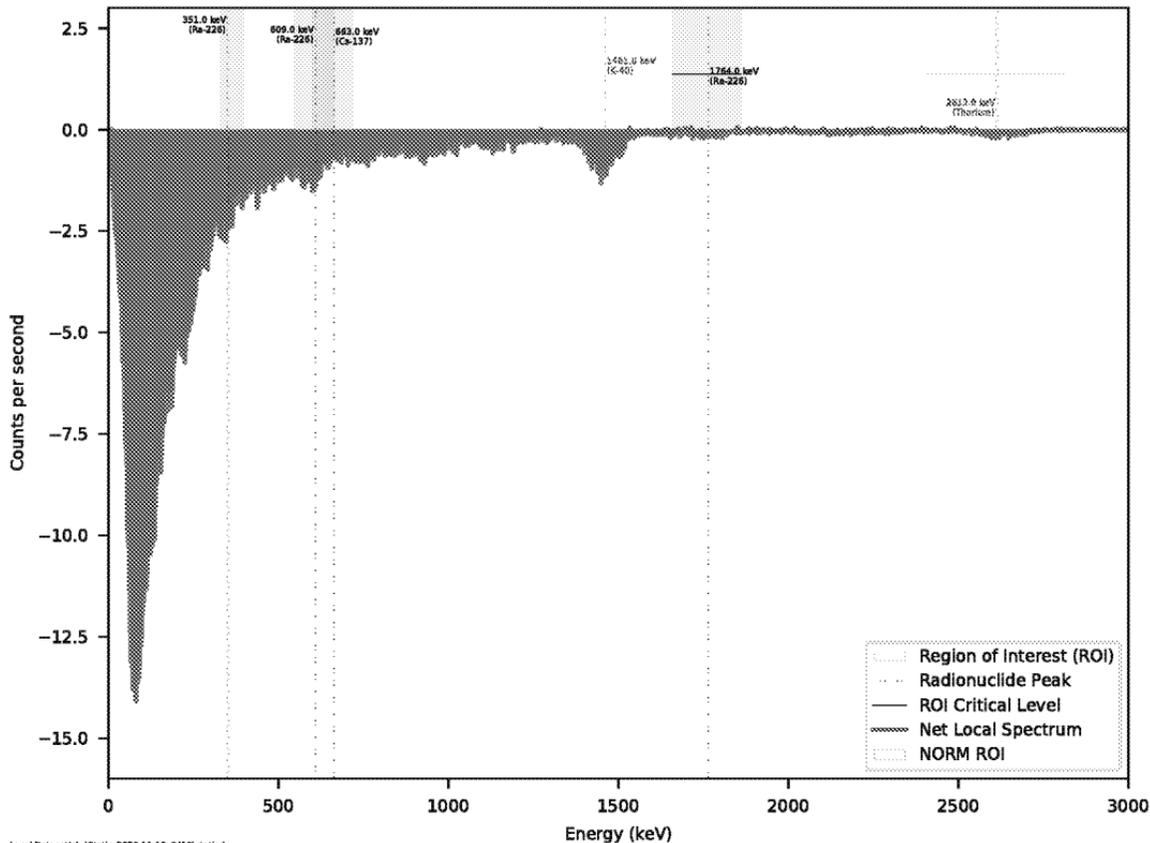
# Net Gamma Spectrum, Static Location: 16

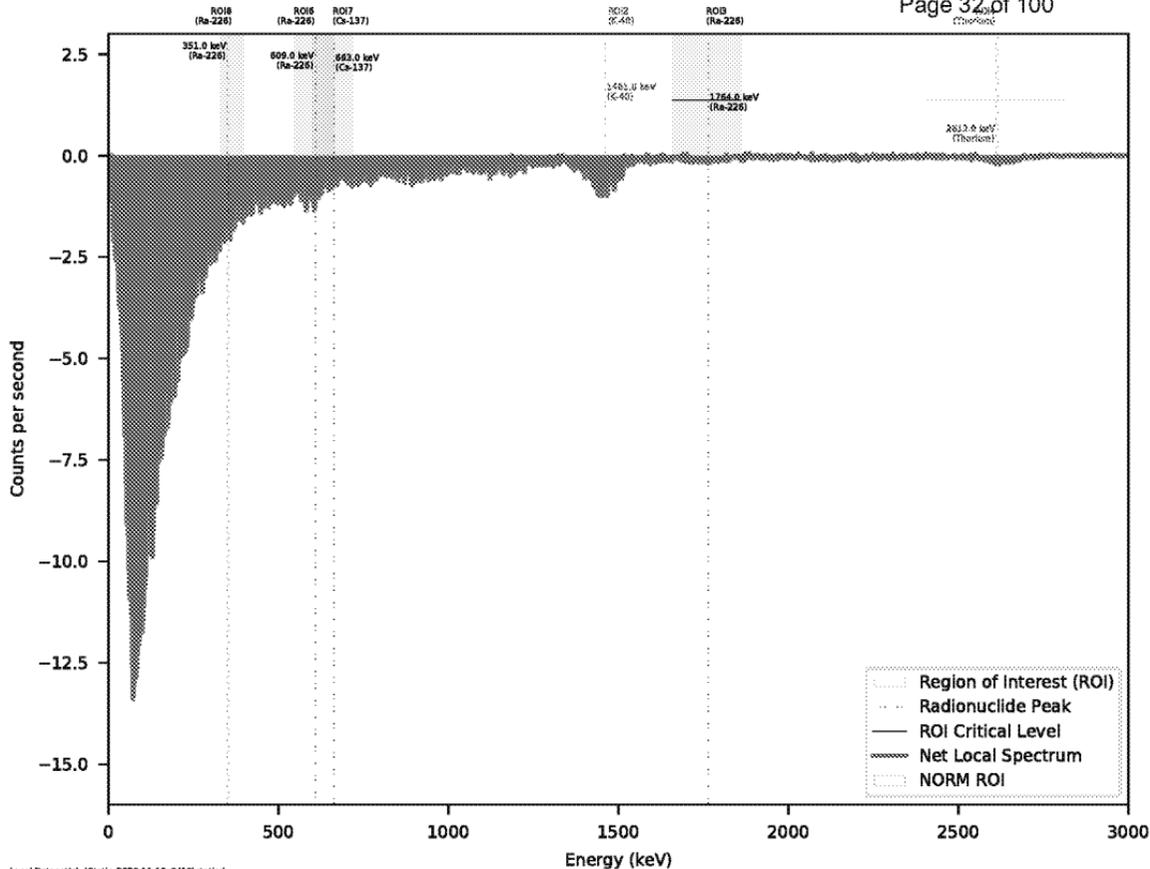


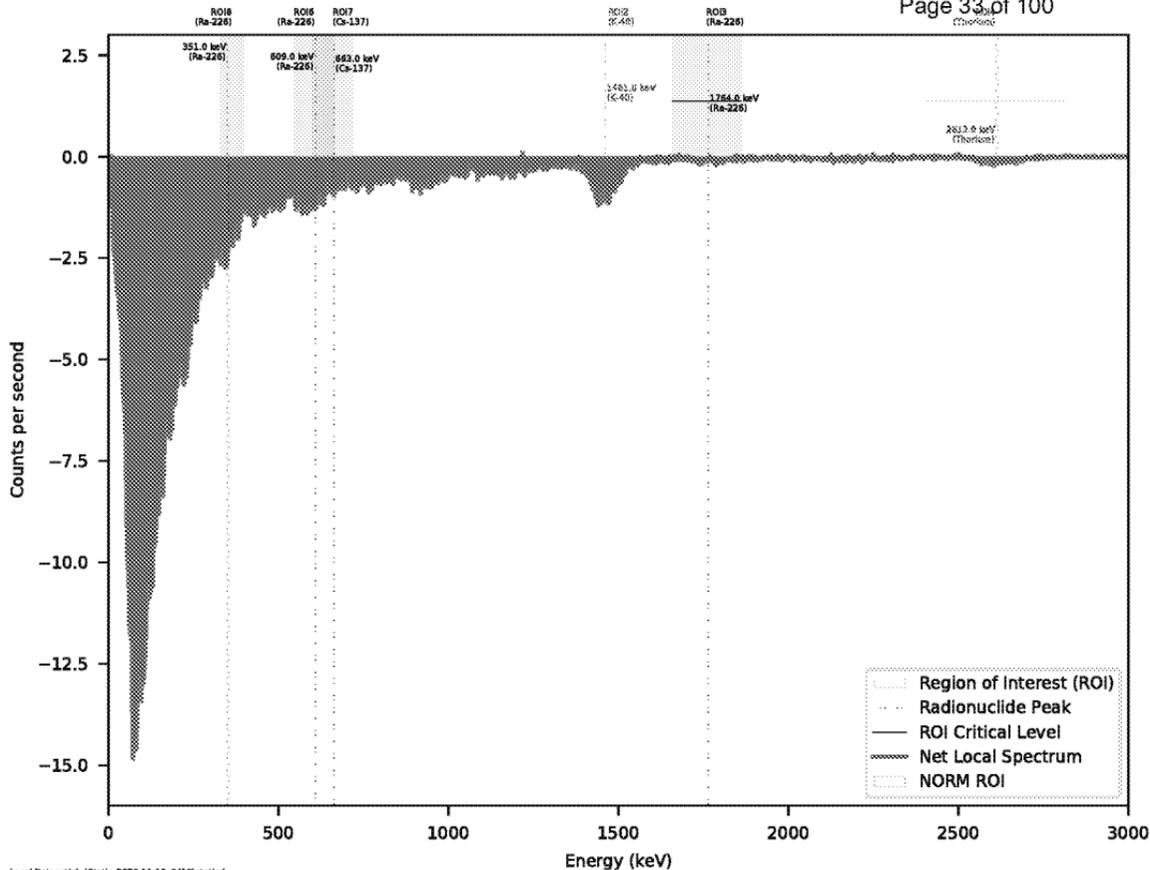
# Net Gamma Spectrum, Static Location: 17

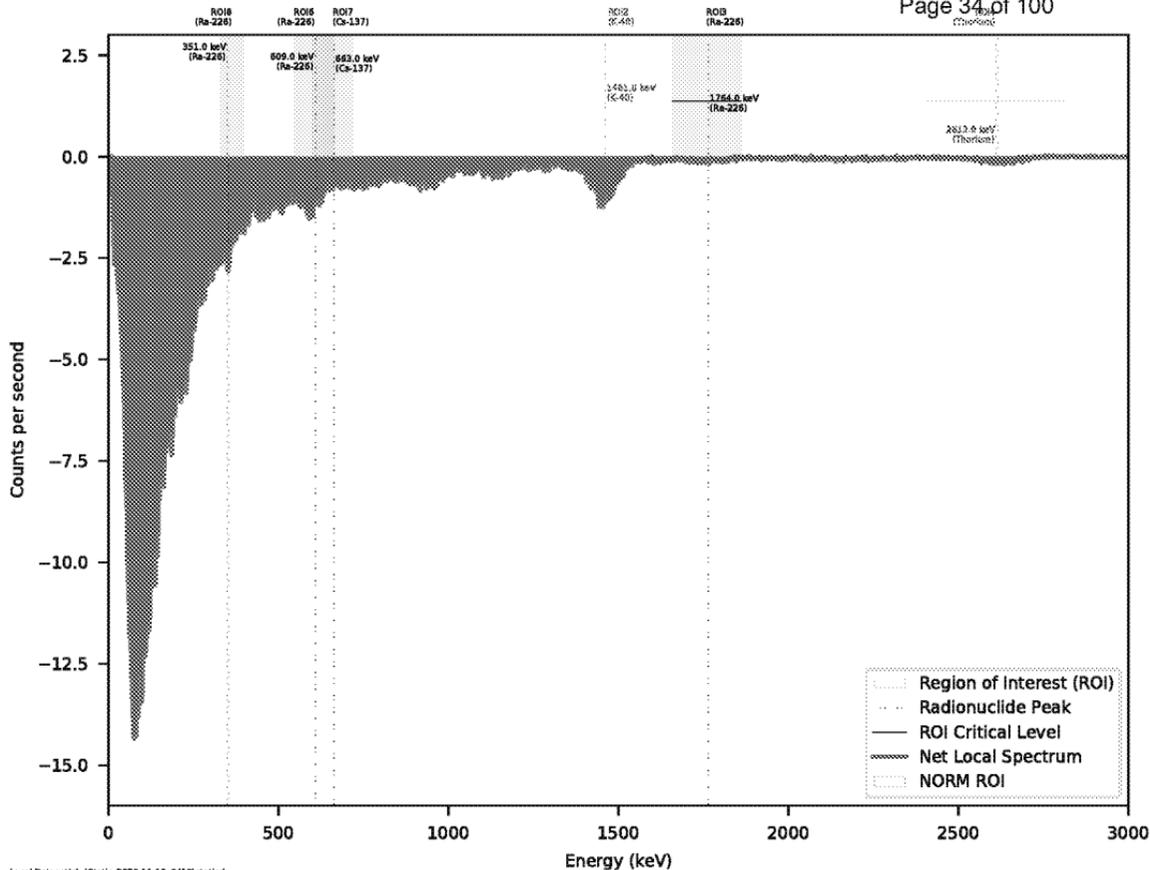


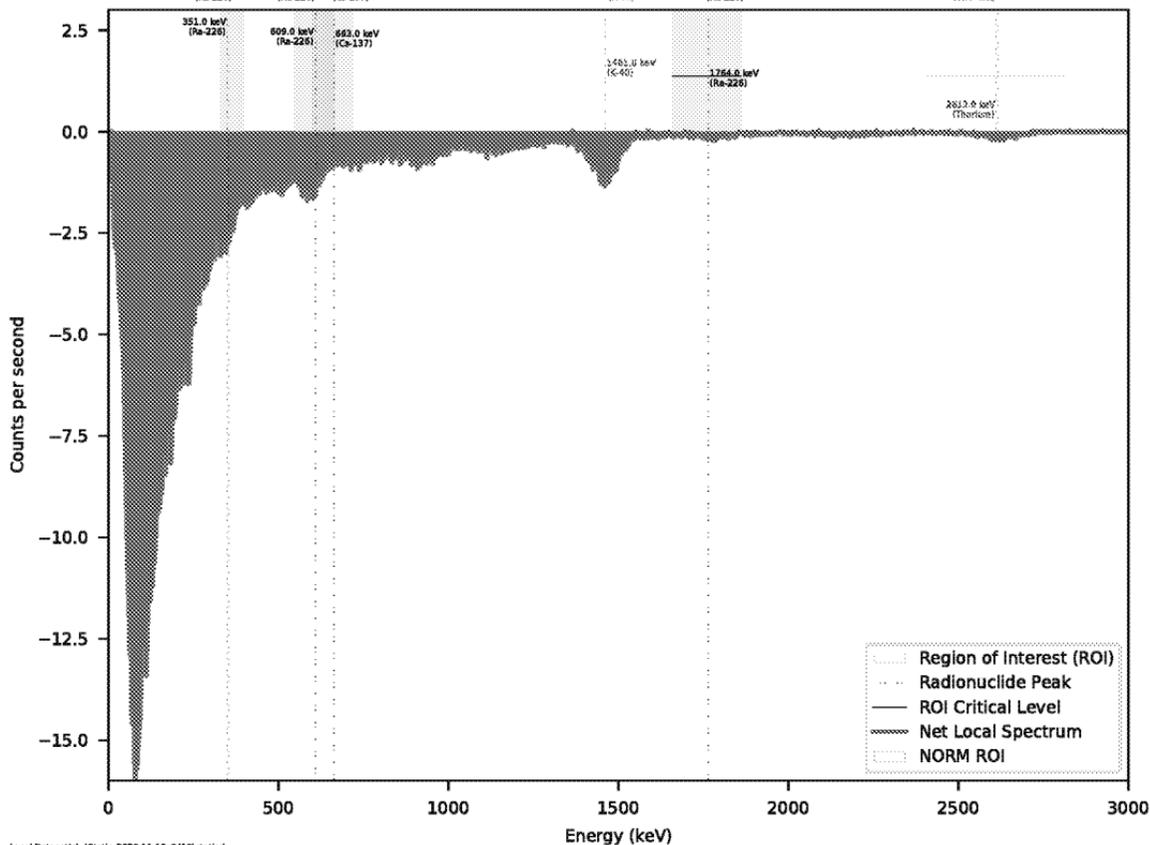
# Net Gamma Spectrum, Static Location: 18

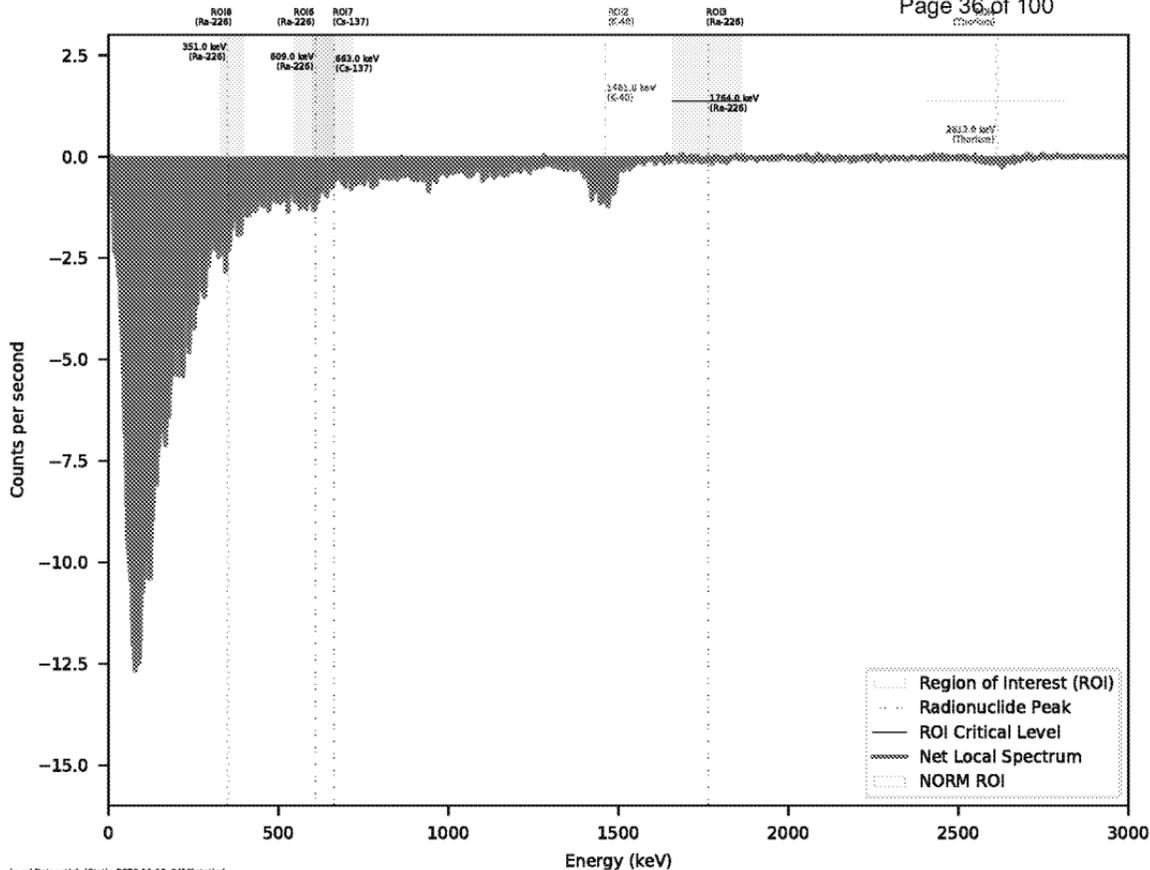


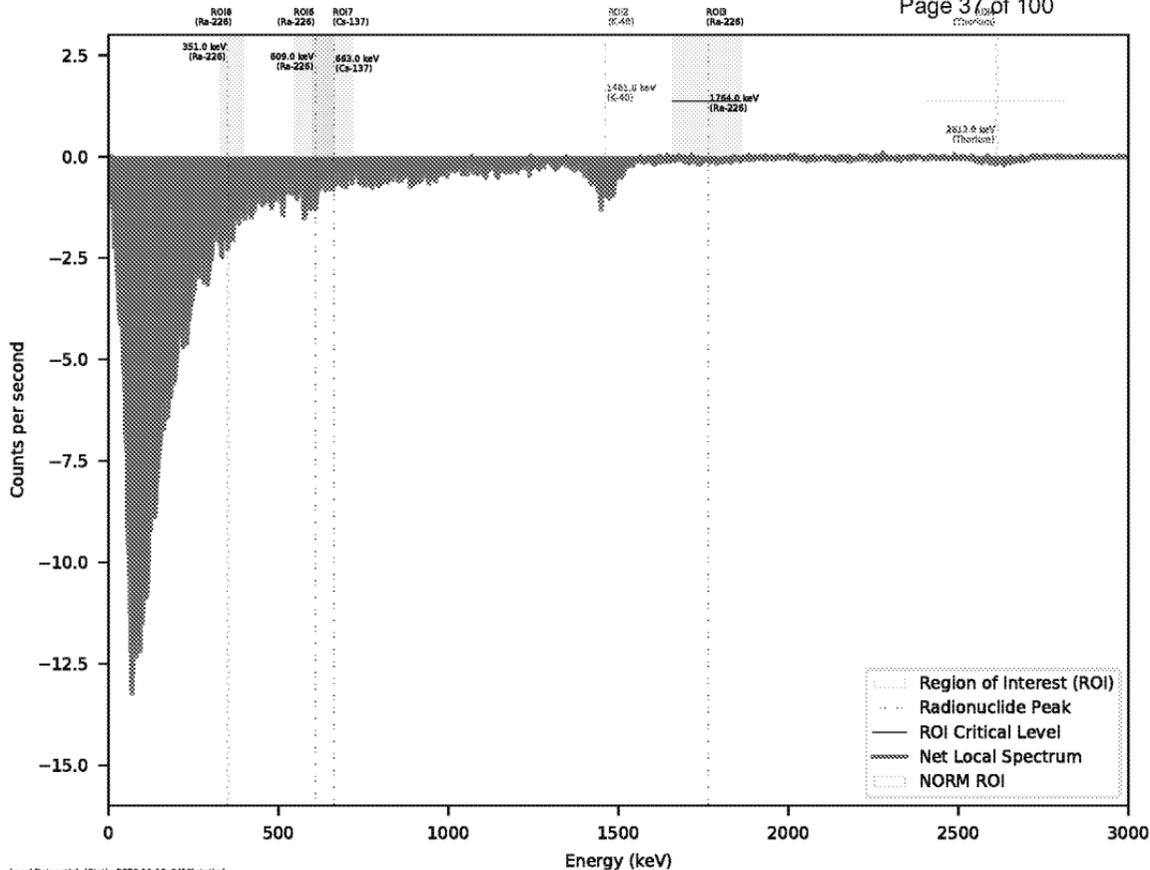


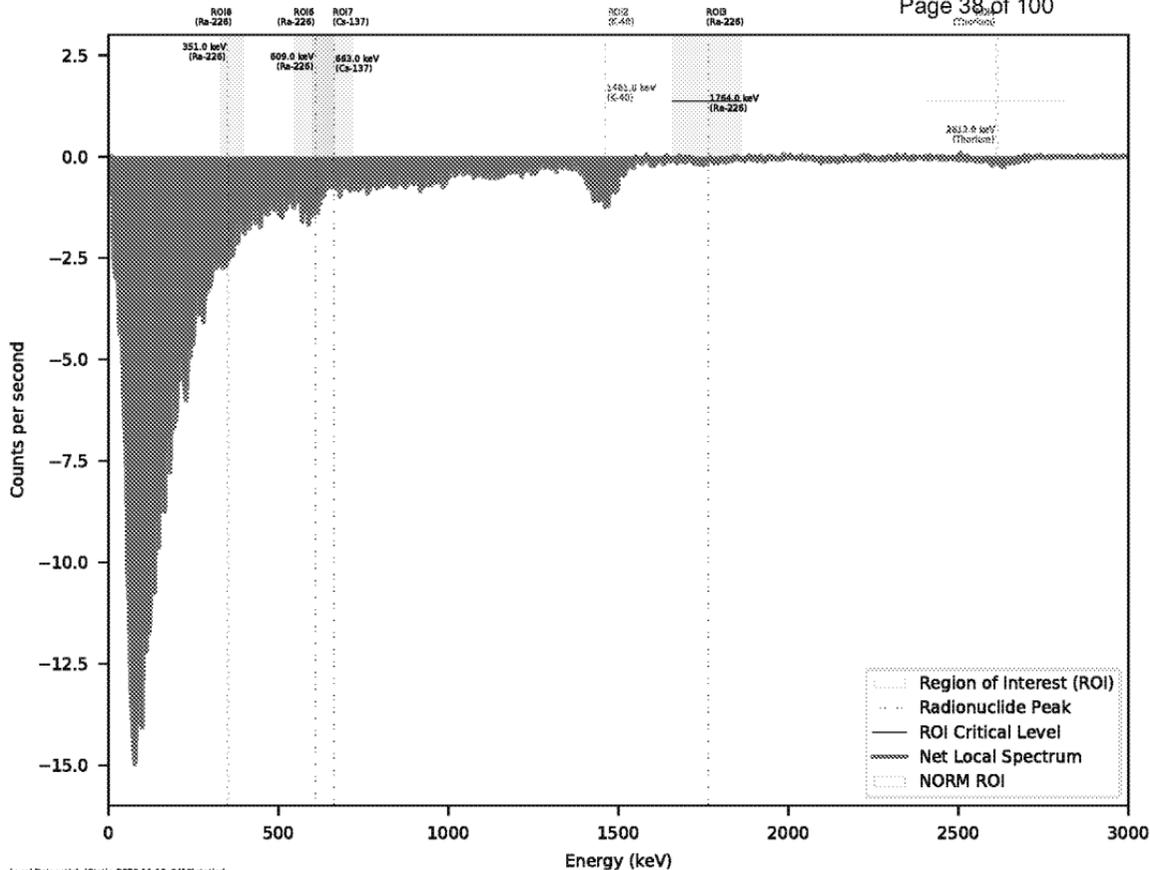


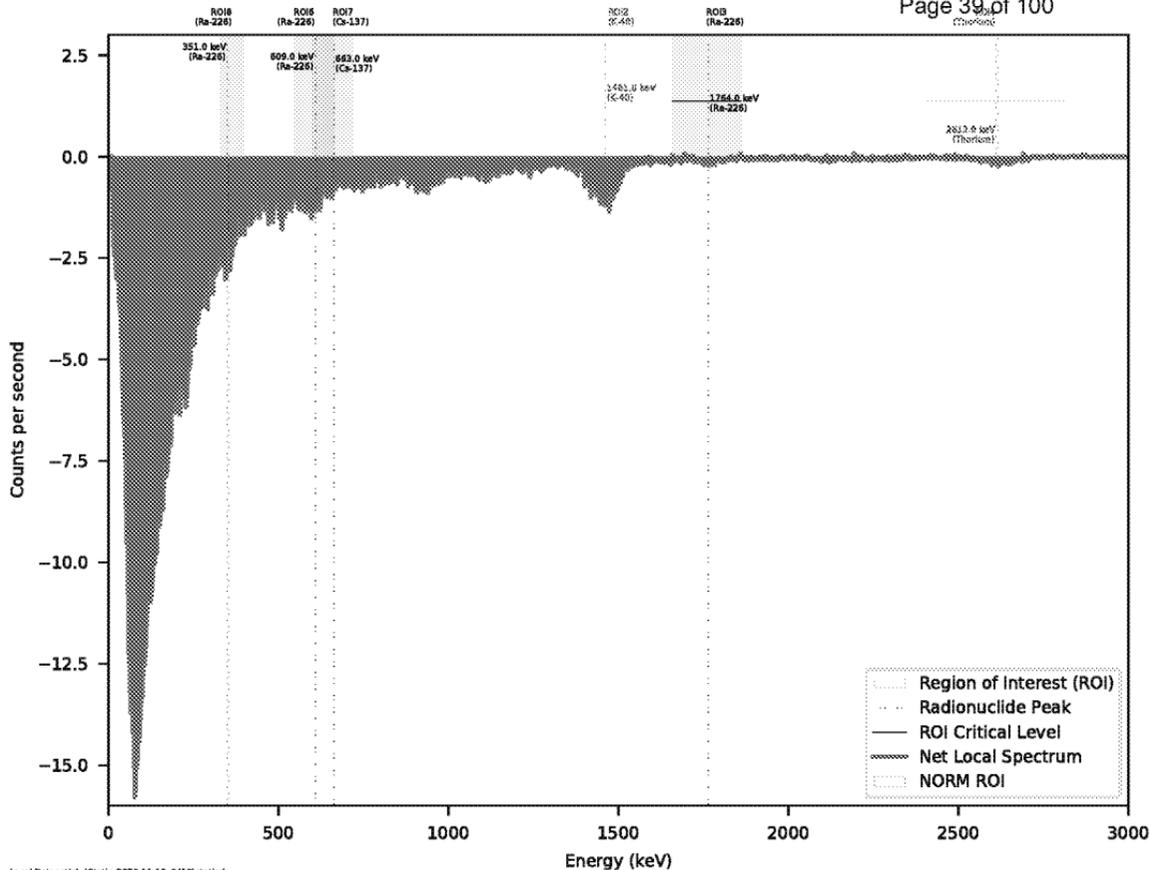


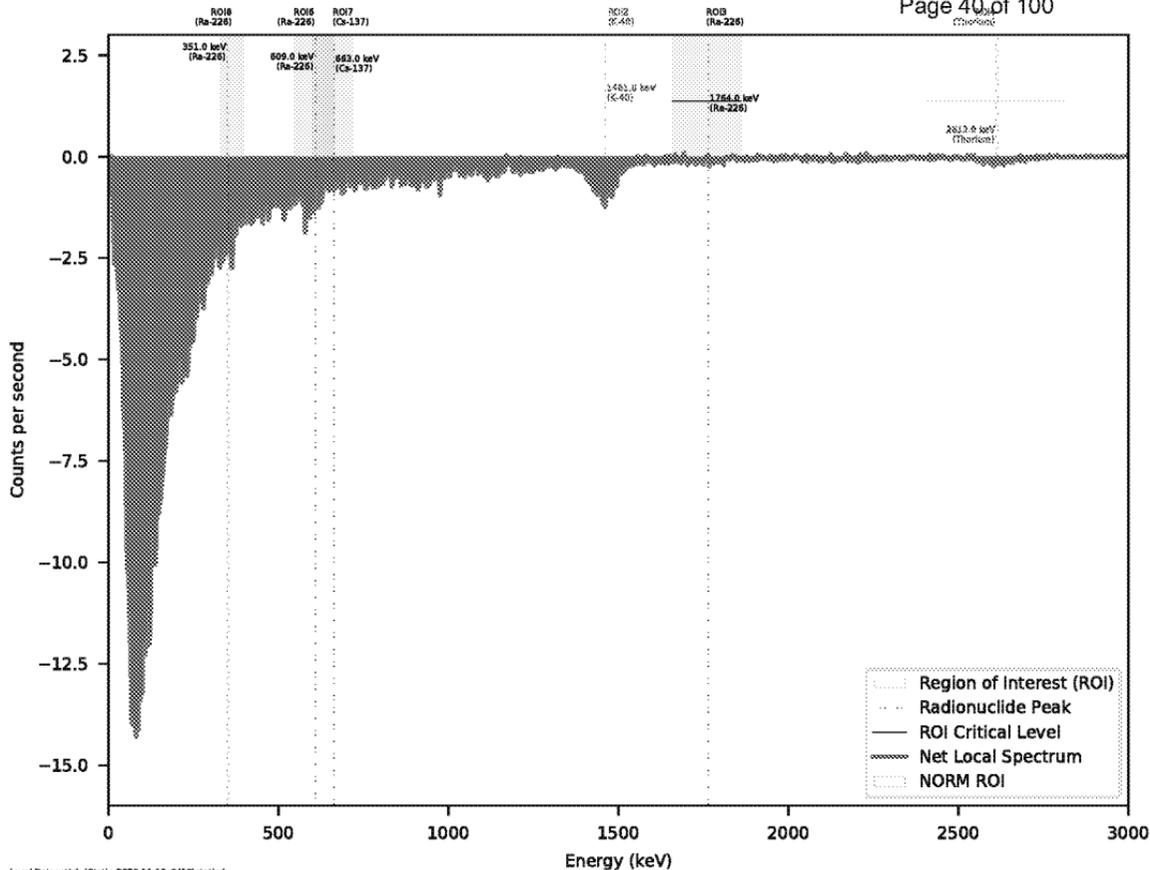




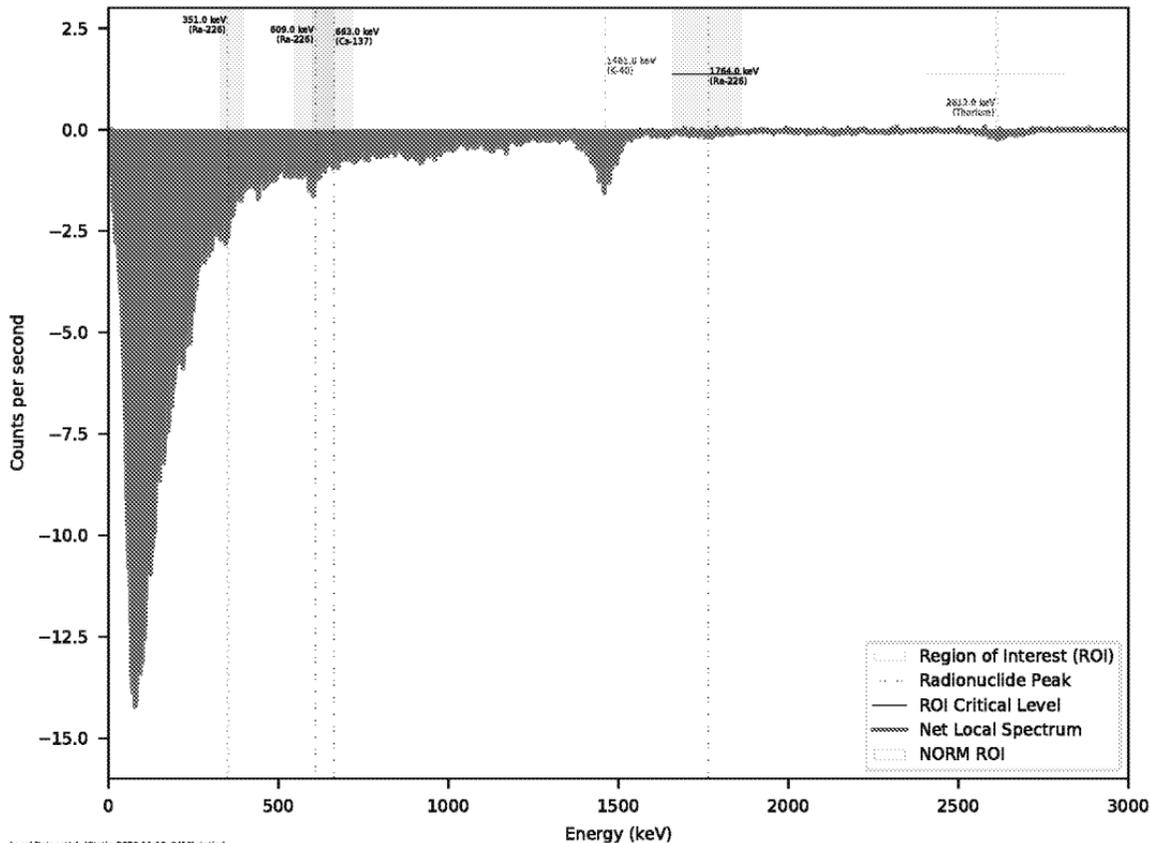




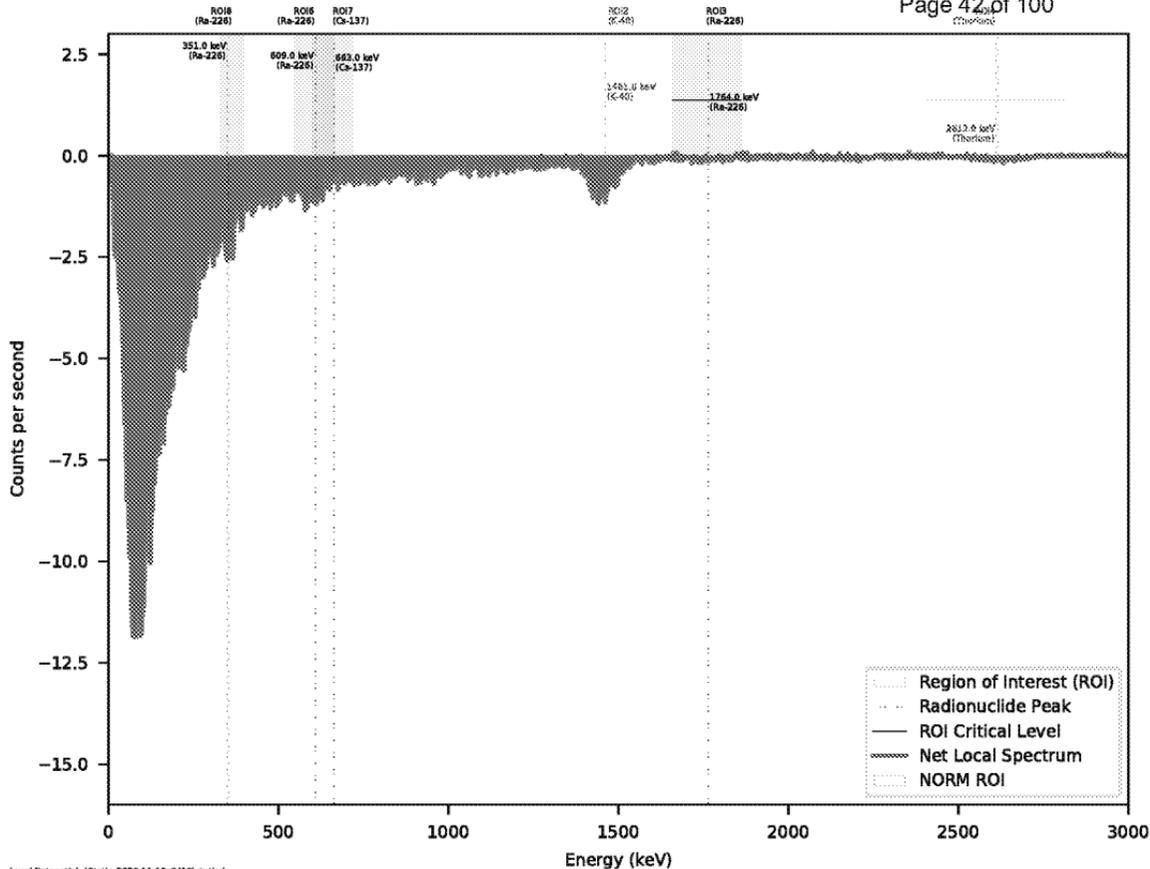


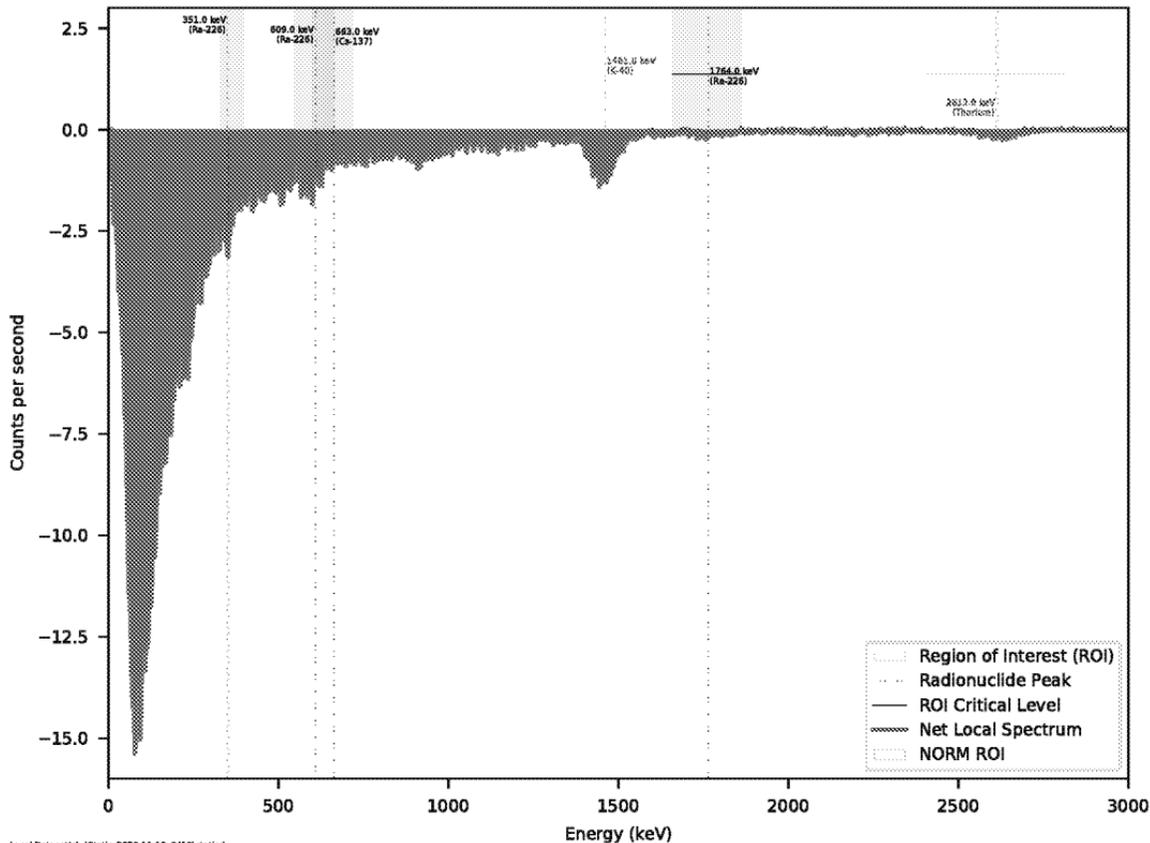


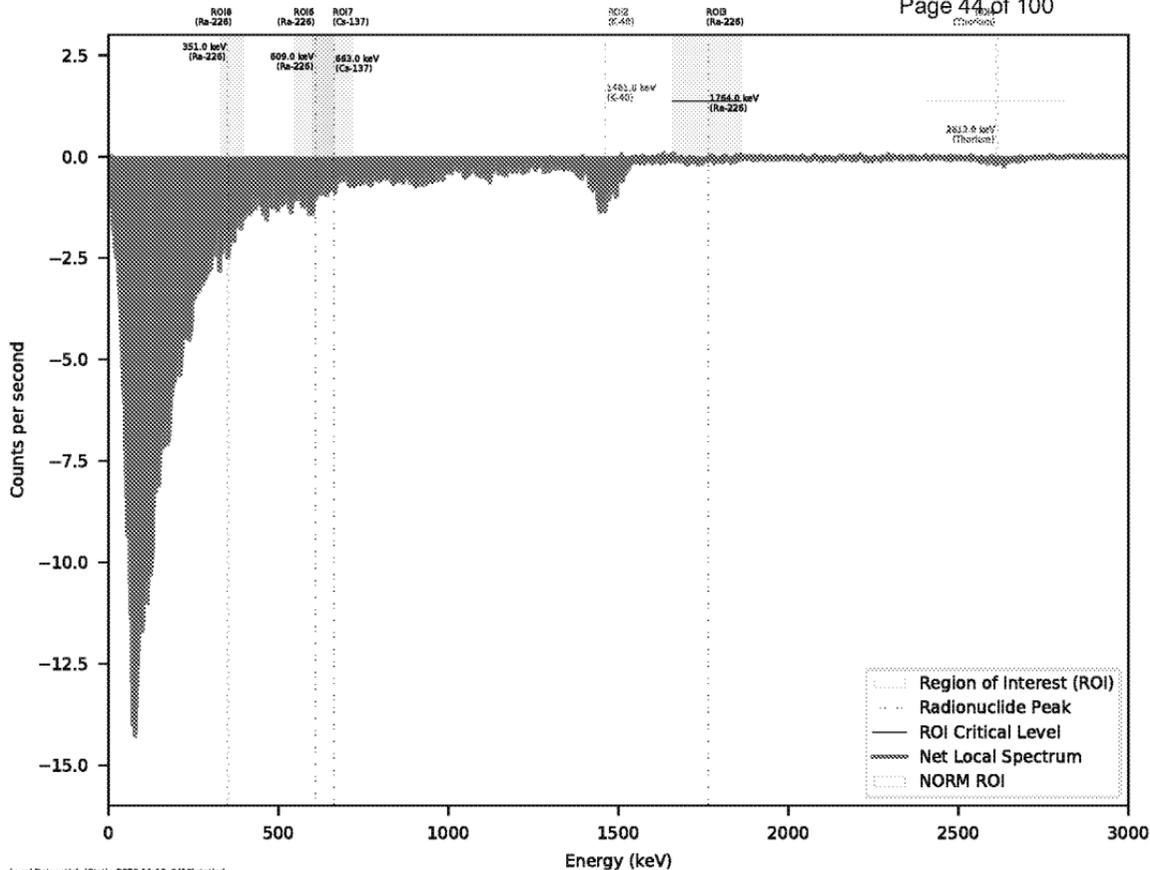
# Net Gamma Spectrum, Static Location: 28

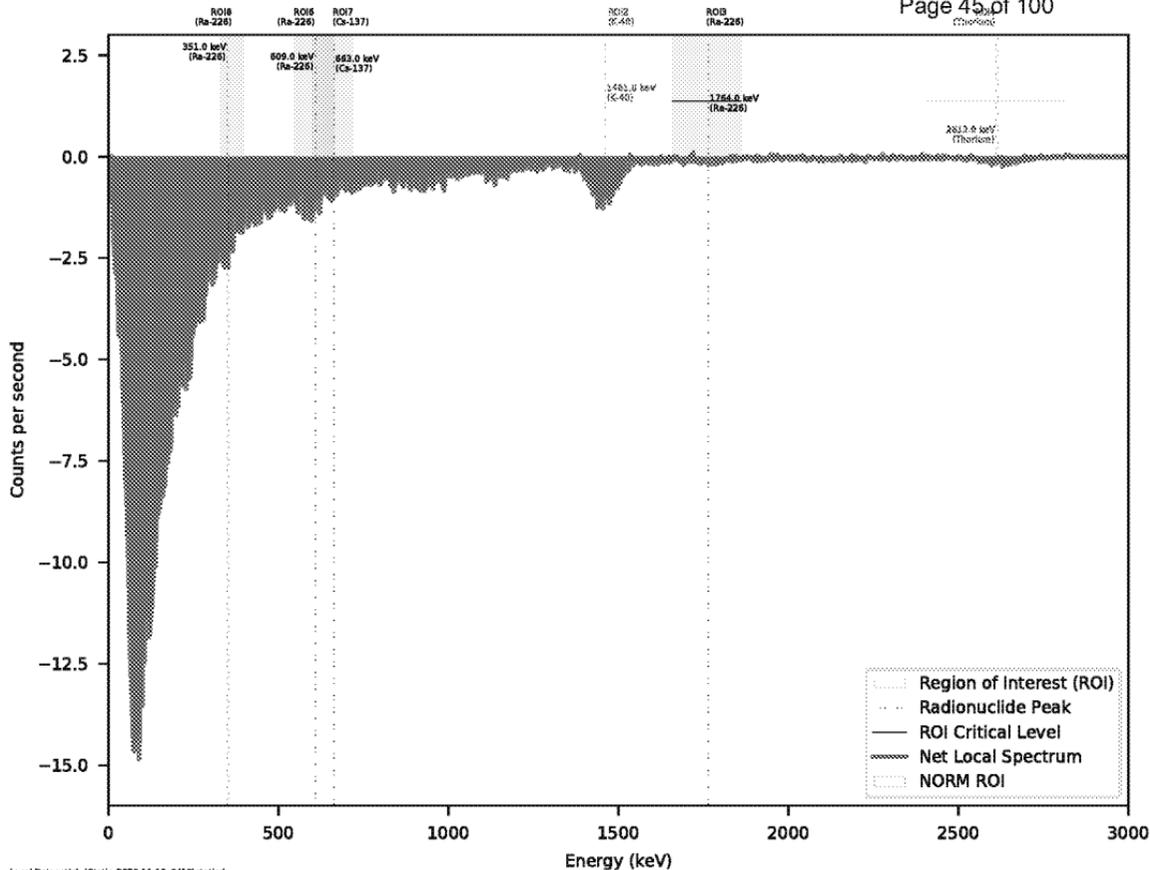


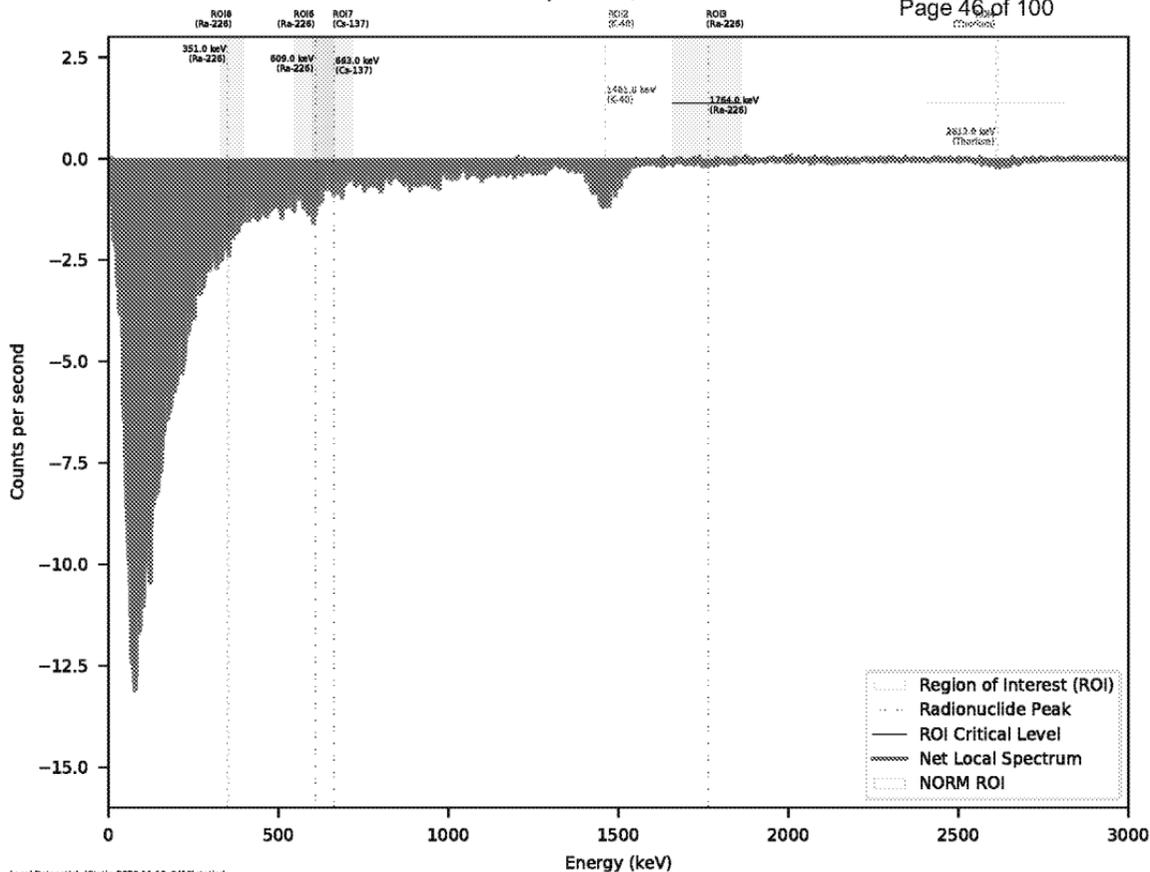
# Net Gamma Spectrum, Static Location: 29

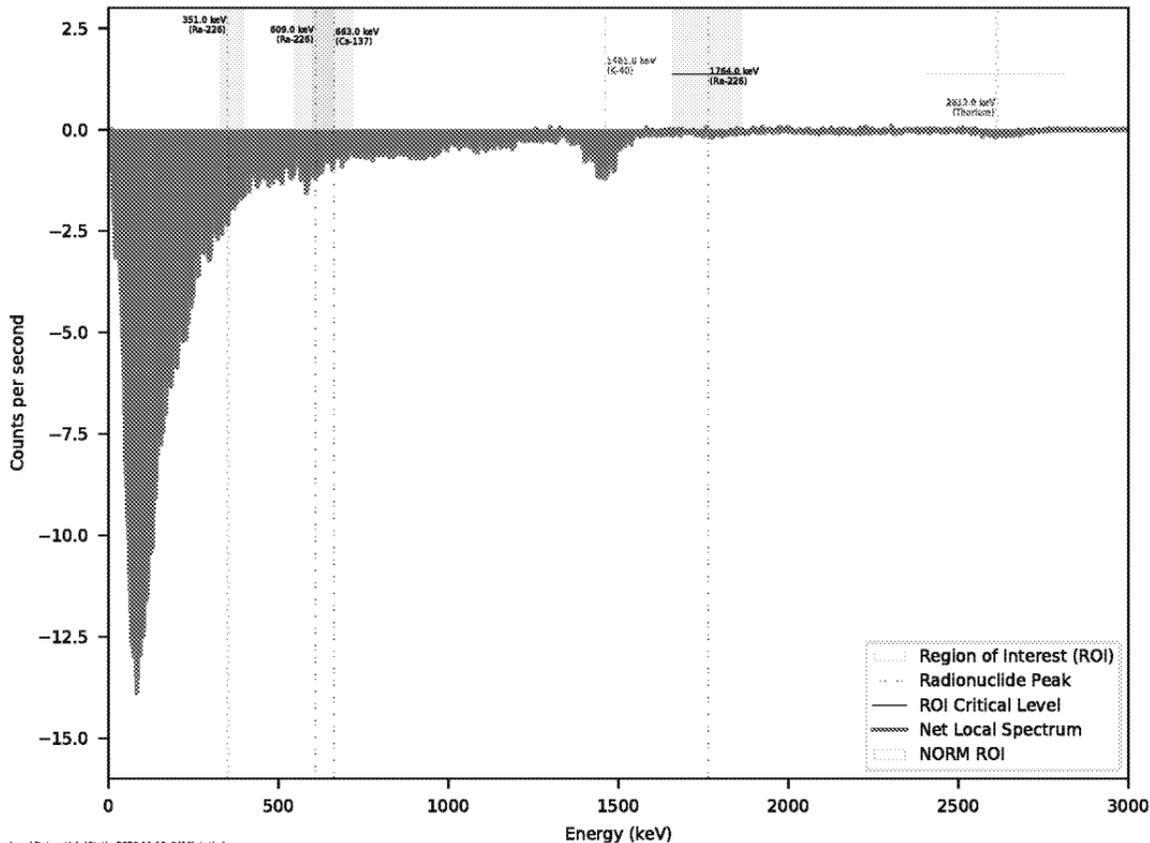


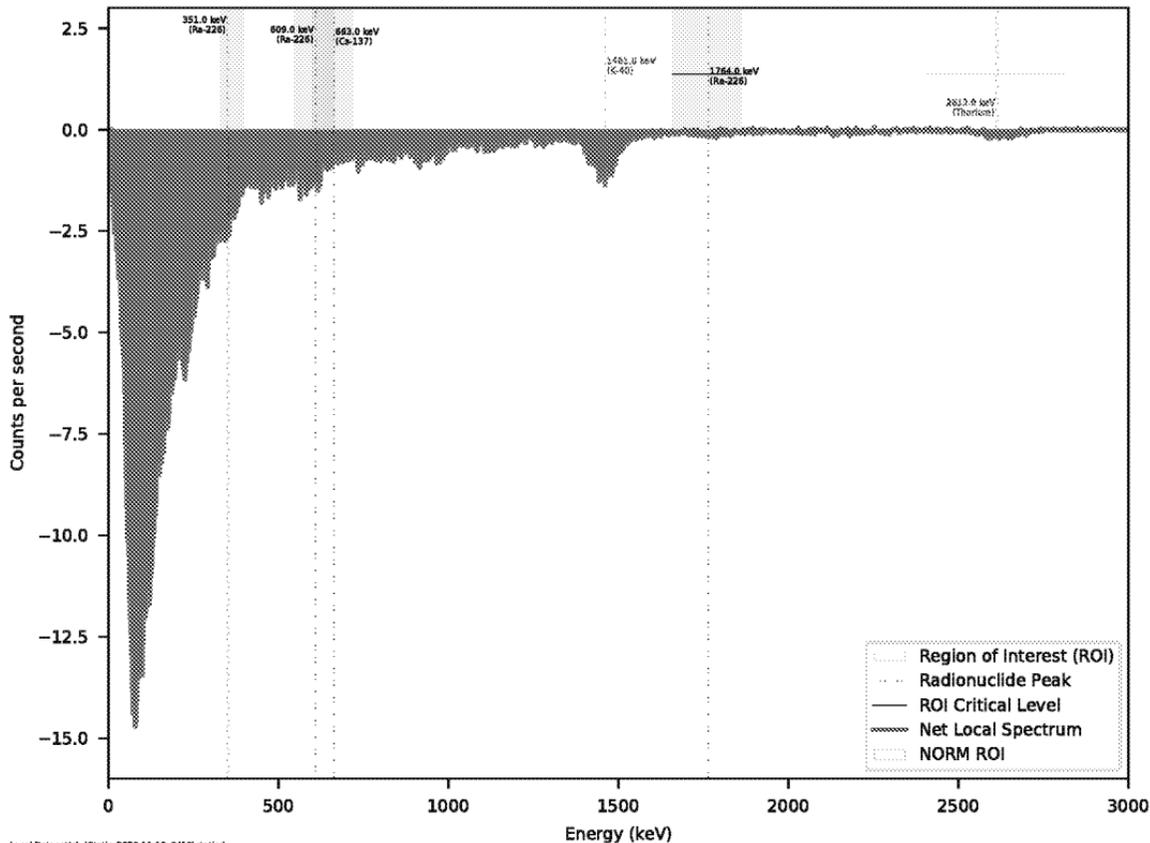


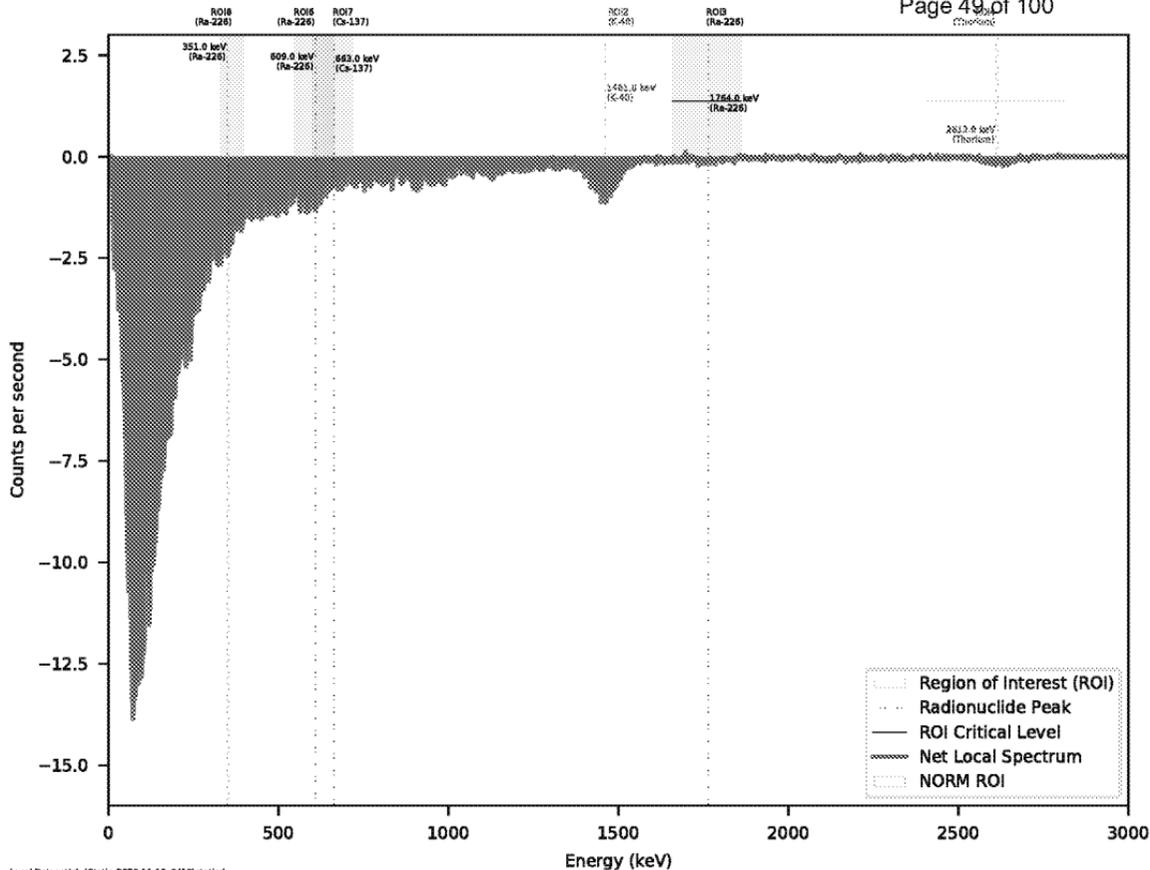














Environment Testing  
America

# ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40480-1  
Laboratory Sample Delivery Group: GJ46599768  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 1

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

Authorized for release by:  
4/12/2021 1:46:11 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

### LINKS

Review your project  
results through  
**Total Access**

Have a Question?

**Ask  
The  
Expert**

Visit us at:  
[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*





# Table of Contents

Cover Page . . . . .	1
Table of Contents . . . . .	2
Case Narrative . . . . .	3
Chain of Custody . . . . .	6
Receipt Checklists . . . . .	10
Definitions/Glossary . . . . .	11
Method Summary . . . . .	12
Sample Summary . . . . .	13
Client Sample Results . . . . .	14
QC Sample Results . . . . .	29
QC Association Summary . . . . .	33
Tracer Carrier Summary . . . . .	35

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
SDG: GJ46599768

**Job ID: 160-40480-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

**Narrative**

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40480-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
SDG: GJ46599768

## Job ID: 160-40480-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 11/19/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 13.6 C.

#### STRONTIUM-90 (GFPC)

Samples HPPG-SFU-TU099A-001 (160-40480-3), HPPG-SFU-TU099A-011 (160-40480-13) and HPPG-SFU-TU099A-021 (160-40480-23) were analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/20/2020, prepared on 12/01/2020 and analyzed on 12/10/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-SFU-TU099A-001 (160-40480-3), HPPG-SFU-TU099A-011 (160-40480-13) and HPPG-SFU-TU099A-021 (160-40480-23).

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-490603/21-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-F-037 (160-40480-1), HPPG-F-038 (160-40480-2), HPPG-SFU-TU099A-001 (160-40480-3), HPPG-SFU-TU099A-002 (160-40480-4), HPPG-SFU-TU099A-003 (160-40480-5), HPPG-SFU-TU099A-004 (160-40480-6), HPPG-SFU-TU099A-005 (160-40480-7), HPPG-SFU-TU099A-006 (160-40480-8), HPPG-SFU-TU099A-007 (160-40480-9), HPPG-SFU-TU099A-008 (160-40480-10), HPPG-SFU-TU099A-009 (160-40480-11), HPPG-SFU-TU099A-010 (160-40480-12), HPPG-SFU-TU099A-011 (160-40480-13), HPPG-SFU-TU099A-012 (160-40480-14), HPPG-SFU-TU099A-013 (160-40480-15), HPPG-SFU-TU099A-014 (160-40480-16), HPPG-SFU-TU099A-015 (160-40480-17), HPPG-SFU-TU099A-016 (160-40480-18), HPPG-SFU-TU099A-017 (160-40480-19), HPPG-SFU-TU099A-018 (160-40480-20), HPPG-SFU-TU099A-019 (160-40480-21), HPPG-SFU-TU099A-020 (160-40480-22), HPPG-SFU-TU099A-021 (160-40480-23), HPPG-SFU-TU099A-022 (160-40480-24), HPPG-SFU-TU099A-023 (160-40480-25), HPPG-SFU-TU099A-024 (160-40480-26) and HPPG-SFU-TU099A-025 (160-40480-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 11/20/2020, prepared on 11/24/2020 and 11/25/2020 and analyzed on 12/15/2020 and 12/16/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
SDG: GJ46599768

---

## Job ID: 160-40480-1 (Continued)

---

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Bi-214            Ra-226

Gamma prep batch 490116

The Radium-226 detection goal of 0.200 pCi/g was not met for the method blank (MB). This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. (MB 160-490116/1-A)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Th-234/U-238:HPPG-SFU-TU099A-004 (160-40480-6). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

The method blank (MB) z-score associated with Prep Batch 160-490116 is within limits and is stored in the level IV raw data. (MB 160-490116/1-A)

Gamma prep batch 490251

The method blank (MB) z-score associated with Prep Batch 160-490251 is within limits and is stored in the level IV raw data. (MB 160-490251/1-A)

Gamma prep batch 490262

The method blank (MB) z-score associated with Prep Batch 160-490262 is within limits and is stored in the level IV raw data. (MB 160-490262/22-A)

The replicate precision for Bi-214/Ra-226 associated with Prep Batch 160-490262 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40531-A-16-C DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri  
Paul LeBlanc

# CHAIN OF CUSTODY

Ref. Document # 501197RSY-034

Project Number: 501197  
 Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
 Project Location: San Francisco, CA  
 Purchase Order #: 1159058  
 Shipment/Pickup Date: 11/18/2020  
 Waybill Number: 49570225630d  
 Lab Destination: Test America (St. Louis Lab)  
 13715 Rider Trail North  
 Earth City, MO 63046  
 Lab Contact Name/ph #: Rhoda Ridenbower (314)298-8566

Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Analysis Requested				Dose Rate uR/Hr	Evidence Bag ID	Comment



Page 6 of 35

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method								
HPPG-F-037	11/18/2020	09:17	G	SO	1	16 oz. plastic jar	X		4	GJ46599768	
HPPG-F-038	11/18/2020	09:40	G	SO	1	16 oz. plastic jar	X		4	GJ46599768	
HPPG-SFU-TU099A-001	11/18/2020	08:19	G	SO	1	16 oz. plastic jar	X	X	4	GJ46599768	
HPPG-SFU-TU099A-002	11/18/2020	08:31	G	SO	1	16 oz. plastic jar	X		4	GJ46599768	
HPPG-SFU-TU099A-003	11/18/2020	08:38	G	SO	1	16 oz. plastic jar	X		4	GJ46599768	
HPPG-SFU-TU099A-004	11/18/2020	08:41	G	SO	1	16 oz. plastic jar	X		4	GJ46599768	
HPPG-SFU-TU099A-005	11/18/2020	08:46	G	SO	1	16 oz. plastic jar	X		4	GJ46599768	
HPPG-SFU-TU099A-006	11/18/2020	08:49	G	SO	1	16 oz. plastic jar	X		4	GJ46599768	

Special Instructions: 21 day ingrowth results only

Turanaround Time: 3-day  10-Day  28-day  Other  Level of QC Required: I  II  III  Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/18/2020 14:05	SHIPPEDTOLAB		11/19/2020 09:15

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*

4/12/2021 (Rev. 1)



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-034

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murr  
Paul LeBlanc

Project Number: 501197  
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
Project Location: San Francisco, CA  
Purchase Order #: 1159058  
Shipment/Pickup Date: 11/18/2020  
Waybill Number: 4957 0225 6300  
Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested						Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)							
HPPG-SFU-TU099A-007	11/18/2020	08:52	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-008	11/18/2020	08:55	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-009	11/18/2020	08:59	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-010	11/18/2020	09:03	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-011	11/18/2020	09:07	G	SO	1	16 oz. plastic jar	X		X				4	GJ46599768	
HPPG-SFU-TU099A-012	11/18/2020	09:10	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-013	11/18/2020	09:14	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-014	11/18/2020	09:17	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-015	11/18/2020	09:21	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-016	11/18/2020	09:24	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-017	11/18/2020	09:27	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-018	11/18/2020	09:30	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-019	11/18/2020	09:32	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-020	11/18/2020	09:35	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-021	11/18/2020	09:37	G	SO	1	16 oz. plastic jar	X		X				4	GJ46599768	
HPPG-SFU-TU099A-022	11/18/2020	09:40	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	
HPPG-SFU-TU099A-023	11/18/2020	09:38	G	SO	1	16 oz. plastic jar	X						4	GJ46599768	

Page 7 of 35

4/12/2021 (Rev. 1)





# CHAIN OF CUSTODY

Ref. Document # 501197RSY-034

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri  
Paul LeBlanc

Project Number: 501197  
Project Name: Hunters Point Naval Shipyard; Parcel G Remedial Action  
Project Location: San Francisco, CA  
Purchase Order #: 1159058  
Shipment/Pickup Date: 11/18/2020  
Waybill Number: 4957 0225 6300  
Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #: Rhoda Ridenbower (314)298-8566

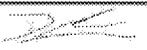
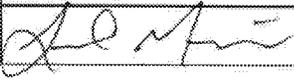
Matrix	# of Containers	Container Type	Analysis Requested				Dose Rate uR/Hr	Evidence Bag ID	Comment
			Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)					
		Preservatives (water)							
		Preservatives (soil)							
		HPPG-SFU-TU099A-024	X			4	GJ46599768		
		HPPG-SFU-TU099A-025	X			4	GJ46599768		

Page 8 of 35

4/12/2021 (Rev. 1)



# All Transfers for COC 501197RSY-034

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/18/2020 14:05	SHIPPEDTOLAB		11/19/2020 09:15

*Devin*

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40480-1

SDG Number: GJ46599768

**Login Number: 40480****List Number: 1****Creator: Greer, Diane A****List Source: Eurofins TestAmerica, St. Louis**

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
SDG: GJ46599768

## Qualifiers

### Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
SDG: GJ46599768

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

**Protocol References:**

- DOE = U.S. Department of Energy
- EPA = US Environmental Protection Agency
- None = None

**Laboratory References:**

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Sample Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
SDG: GJ46599768

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40480-1	HPPG-F-037	Solid	11/18/20 09:17	11/19/20 11:19	
160-40480-2	HPPG-F-038	Solid	11/18/20 09:40	11/19/20 11:19	
160-40480-3	HPPG-SFU-TU099A-001	Solid	11/18/20 08:19	11/19/20 11:19	
160-40480-4	HPPG-SFU-TU099A-002	Solid	11/18/20 08:31	11/19/20 11:19	
160-40480-5	HPPG-SFU-TU099A-003	Solid	11/18/20 08:38	11/19/20 11:19	
160-40480-6	HPPG-SFU-TU099A-004	Solid	11/18/20 08:41	11/19/20 11:19	
160-40480-7	HPPG-SFU-TU099A-005	Solid	11/18/20 08:46	11/19/20 11:19	
160-40480-8	HPPG-SFU-TU099A-006	Solid	11/18/20 08:49	11/19/20 11:19	
160-40480-9	HPPG-SFU-TU099A-007	Solid	11/18/20 08:52	11/19/20 11:19	
160-40480-10	HPPG-SFU-TU099A-008	Solid	11/18/20 08:55	11/19/20 11:19	
160-40480-11	HPPG-SFU-TU099A-009	Solid	11/18/20 08:59	11/19/20 11:19	
160-40480-12	HPPG-SFU-TU099A-010	Solid	11/18/20 09:03	11/19/20 11:19	
160-40480-13	HPPG-SFU-TU099A-011	Solid	11/18/20 09:07	11/19/20 11:19	
160-40480-14	HPPG-SFU-TU099A-012	Solid	11/18/20 09:10	11/19/20 11:19	
160-40480-15	HPPG-SFU-TU099A-013	Solid	11/18/20 09:14	11/19/20 11:19	
160-40480-16	HPPG-SFU-TU099A-014	Solid	11/18/20 09:17	11/19/20 11:19	
160-40480-17	HPPG-SFU-TU099A-015	Solid	11/18/20 09:21	11/19/20 11:19	
160-40480-18	HPPG-SFU-TU099A-016	Solid	11/18/20 09:24	11/19/20 11:19	
160-40480-19	HPPG-SFU-TU099A-017	Solid	11/18/20 09:27	11/19/20 11:19	
160-40480-20	HPPG-SFU-TU099A-018	Solid	11/18/20 09:30	11/19/20 11:19	
160-40480-21	HPPG-SFU-TU099A-019	Solid	11/18/20 09:32	11/19/20 11:19	
160-40480-22	HPPG-SFU-TU099A-020	Solid	11/18/20 09:35	11/19/20 11:19	
160-40480-23	HPPG-SFU-TU099A-021	Solid	11/18/20 09:37	11/19/20 11:19	
160-40480-24	HPPG-SFU-TU099A-022	Solid	11/18/20 09:40	11/19/20 11:19	
160-40480-25	HPPG-SFU-TU099A-023	Solid	11/18/20 09:38	11/19/20 11:19	
160-40480-26	HPPG-SFU-TU099A-024	Solid	11/18/20 09:42	11/19/20 11:19	
160-40480-27	HPPG-SFU-TU099A-025	Solid	11/18/20 09:45	11/19/20 11:19	

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-F-037**

**Lab Sample ID: 160-40480-1**

Date Collected: 11/18/20 09:17

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.272</b>		0.0896	0.0938		0.0172	pCi/g	11/24/20 16:52	12/15/20 12:21	1
Actinium-227	0.157	U	0.232	0.232		0.169	pCi/g	11/24/20 16:52	12/15/20 12:21	1
Bismuth-212	-0.0949	U	0.420	0.420		0.337	pCi/g	11/24/20 16:52	12/15/20 12:21	1
<b>Bismuth-214</b>	<b>0.275</b>		0.0721	0.0775		0.0267	pCi/g	11/24/20 16:52	12/15/20 12:21	1
Cesium-137	0.0151	U	0.0251	0.0252	0.0700	0.0187	pCi/g	11/24/20 16:52	12/15/20 12:21	1
Lead-210	-0.252	U	0.726	0.726		0.582	pCi/g	11/24/20 16:52	12/15/20 12:21	1
<b>Lead-212</b>	<b>0.172</b>		0.0503	0.0550		0.0288	pCi/g	11/24/20 16:52	12/15/20 12:21	1
<b>Lead-214</b>	<b>0.186</b>		0.0614	0.0644		0.0289	pCi/g	11/24/20 16:52	12/15/20 12:21	1
<b>Potassium-40</b>	<b>4.85</b>		0.751	0.900		0.0677	pCi/g	11/24/20 16:52	12/15/20 12:21	1
Protactinium-231	0.000	U	0.372	0.373		1.19	pCi/g	11/24/20 16:52	12/15/20 12:21	1
Protactinium-234	-0.0627	U	0.176	0.176		0.143	pCi/g	11/24/20 16:52	12/15/20 12:21	1
<b>Radium-226</b>	<b>0.275</b>		0.0721	0.0775	0.200	0.0267	pCi/g	11/24/20 16:52	12/15/20 12:21	1
<b>Radium-228</b>	<b>0.272</b>		0.0896	0.0938		0.0172	pCi/g	11/24/20 16:52	12/15/20 12:21	1
<b>Thallium-208</b>	<b>0.0867</b>		0.0298	0.0311		0.00821	pCi/g	11/24/20 16:52	12/15/20 12:21	1
<b>Thorium 228</b>	<b>0.172</b>		0.0503	0.0550		0.0288	pCi/g	11/24/20 16:52	12/15/20 12:21	1
<b>Thorium-232</b>	<b>0.272</b>		0.0896	0.0938		0.0172	pCi/g	11/24/20 16:52	12/15/20 12:21	1
Thorium-234	0.000	U	0.258	0.259		0.520	pCi/g	11/24/20 16:52	12/15/20 12:21	1
Uranium-235	0.0455	U	0.141	0.141		0.263	pCi/g	11/24/20 16:52	12/15/20 12:21	1
Uranium-238	0.000	U	0.258	0.259		0.520	pCi/g	11/24/20 16:52	12/15/20 12:21	1

**Client Sample ID: HPPG-F-038**

**Lab Sample ID: 160-40480-2**

Date Collected: 11/18/20 09:40

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.239</b>		0.117	0.120		0.0415	pCi/g	11/24/20 16:52	12/15/20 12:52	1
Actinium-227	0.00992	U	0.358	0.358		0.213	pCi/g	11/24/20 16:52	12/15/20 12:52	1
<b>Bismuth-212</b>	<b>0.542</b>		0.247	0.253		0.0599	pCi/g	11/24/20 16:52	12/15/20 12:52	1
Bismuth-214	0.0944	U	0.0674	0.0682		0.110	pCi/g	11/24/20 16:52	12/15/20 12:52	1
Cesium-137	0.0152	U	0.0372	0.0372	0.0700	0.0292	pCi/g	11/24/20 16:52	12/15/20 12:52	1
Lead-210	0.401	U	0.893	0.895		0.714	pCi/g	11/24/20 16:52	12/15/20 12:52	1
<b>Lead-212</b>	<b>0.219</b>		0.0493	0.0569		0.0210	pCi/g	11/24/20 16:52	12/15/20 12:52	1
<b>Lead-214</b>	<b>0.272</b>		0.0806	0.0854		0.0346	pCi/g	11/24/20 16:52	12/15/20 12:52	1
<b>Potassium-40</b>	<b>5.57</b>		0.876	1.05		0.208	pCi/g	11/24/20 16:52	12/15/20 12:52	1
Protactinium-231	0.370	U	1.02	1.02		1.12	pCi/g	11/24/20 16:52	12/15/20 12:52	1
Protactinium-234	0.0923	U	0.121	0.121		0.122	pCi/g	11/24/20 16:52	12/15/20 12:52	1
Radium-226	0.0944	U	0.0674	0.0682	0.200	0.110	pCi/g	11/24/20 16:52	12/15/20 12:52	1
<b>Radium-228</b>	<b>0.239</b>		0.117	0.120		0.0415	pCi/g	11/24/20 16:52	12/15/20 12:52	1
<b>Thallium-208</b>	<b>0.0887</b>		0.0311	0.0325		0.0115	pCi/g	11/24/20 16:52	12/15/20 12:52	1
<b>Thorium 228</b>	<b>0.219</b>		0.0493	0.0569		0.0210	pCi/g	11/24/20 16:52	12/15/20 12:52	1
<b>Thorium-232</b>	<b>0.239</b>		0.117	0.120		0.0415	pCi/g	11/24/20 16:52	12/15/20 12:52	1
Thorium-234	0.108	U	0.247	0.247		0.704	pCi/g	11/24/20 16:52	12/15/20 12:52	1
Uranium-235	0.0463	U	0.0620	0.0621		0.254	pCi/g	11/24/20 16:52	12/15/20 12:52	1
Uranium-238	0.108	U	0.247	0.247		0.704	pCi/g	11/24/20 16:52	12/15/20 12:52	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-001**

**Lab Sample ID: 160-40480-3**

Date Collected: 11/18/20 08:19

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Strontium-90	-0.126	U	0.140	0.141	0.331	0.125	pCi/g	12/01/20 10:36	12/10/20 17:31	1
Carrier	%Yield	Qualifier	Limits							
Sr Carrier	103		40 - 110							
Y Carrier	95.0		40 - 110							
					Prepared	Analyzed		Dil Fac		
					12/01/20 10:36	12/10/20 17:31		1		
					12/01/20 10:36	12/10/20 17:31		1		

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	<b>0.392</b>		0.138	0.144		0.0285	pCi/g	11/24/20 16:52	12/15/20 12:20	1
Actinium-227	-0.0592	U	0.552	0.552		0.341	pCi/g	11/24/20 16:52	12/15/20 12:20	1
Bismuth-212	-0.0333	U	0.717	0.717		0.587	pCi/g	11/24/20 16:52	12/15/20 12:20	1
<b>Bismuth-214</b>	<b>0.365</b>		0.114	0.120		0.0524	pCi/g	11/24/20 16:52	12/15/20 12:20	1
Cesium-137	-0.0453	U	0.0766	0.0767	0.0700	0.0598	pCi/g	11/24/20 16:52	12/15/20 12:20	1
<b>Lead-210</b>	<b>1.99</b>		1.37	1.39		0.837	pCi/g	11/24/20 16:52	12/15/20 12:20	1
<b>Lead-212</b>	<b>0.346</b>		0.0796	0.0874		0.0372	pCi/g	11/24/20 16:52	12/15/20 12:20	1
<b>Lead-214</b>	<b>0.462</b>		0.143	0.151		0.0613	pCi/g	11/24/20 16:52	12/15/20 12:20	1
<b>Potassium-40</b>	<b>9.20</b>		1.32	1.62		0.111	pCi/g	11/24/20 16:52	12/15/20 12:20	1
Protactinium-231	0.000	U	0.266	0.266		2.18	pCi/g	11/24/20 16:52	12/15/20 12:20	1
Protactinium-234	0.0865	U	0.262	0.262		0.213	pCi/g	11/24/20 16:52	12/15/20 12:20	1
<b>Radium-226</b>	<b>0.365</b>		0.114	0.120	0.200	0.0524	pCi/g	11/24/20 16:52	12/15/20 12:20	1
<b>Radium-228</b>	<b>0.392</b>		0.138	0.144		0.0285	pCi/g	11/24/20 16:52	12/15/20 12:20	1
<b>Thallium-208</b>	<b>0.101</b>		0.0795	0.0801		0.0361	pCi/g	11/24/20 16:52	12/15/20 12:20	1
<b>Thorium 228</b>	<b>0.346</b>		0.0796	0.0874		0.0372	pCi/g	11/24/20 16:52	12/15/20 12:20	1
<b>Thorium-232</b>	<b>0.392</b>		0.138	0.144		0.0285	pCi/g	11/24/20 16:52	12/15/20 12:20	1
Thorium-234	-0.208	U	0.757	0.757		0.629	pCi/g	11/24/20 16:52	12/15/20 12:20	1
Uranium-235	0.109	U	0.279	0.279		0.276	pCi/g	11/24/20 16:52	12/15/20 12:20	1
Uranium-238	-0.208	U	0.757	0.757		0.629	pCi/g	11/24/20 16:52	12/15/20 12:20	1

**Client Sample ID: HPPG-SFU-TU099A-002**

**Lab Sample ID: 160-40480-4**

Date Collected: 11/18/20 08:31

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	<b>0.188</b>		0.188	0.189		0.0963	pCi/g	11/24/20 16:52	12/15/20 13:19	1
Actinium-227	<b>0.385</b>		0.345	0.348		0.185	pCi/g	11/24/20 16:52	12/15/20 13:19	1
Bismuth-212	0.177	U	0.604	0.604		0.476	pCi/g	11/24/20 16:52	12/15/20 13:19	1
<b>Bismuth-214</b>	<b>0.323</b>		0.140	0.145		0.0586	pCi/g	11/24/20 16:52	12/15/20 13:19	1
Cesium-137	0.00234	U	0.0615	0.0615	0.0700	0.0504	pCi/g	11/24/20 16:52	12/15/20 13:19	1
Lead-210	0.899	U	1.36	1.37		1.06	pCi/g	11/24/20 16:52	12/15/20 13:19	1
<b>Lead-212</b>	<b>0.218</b>		0.0689	0.0735		0.0366	pCi/g	11/24/20 16:52	12/15/20 13:19	1
<b>Lead-214</b>	<b>0.194</b>		0.0956	0.0981		0.0855	pCi/g	11/24/20 16:52	12/15/20 13:19	1
<b>Potassium-40</b>	<b>7.29</b>		1.26	1.52		0.269	pCi/g	11/24/20 16:52	12/15/20 13:19	1
Protactinium-231	0.000	U	0.452	0.452		2.05	pCi/g	11/24/20 16:52	12/15/20 13:19	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-002**

**Lab Sample ID: 160-40480-4**

Date Collected: 11/18/20 08:31

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0125	U	0.0235	0.0235		0.238	pCi/g	11/24/20 16:52	12/15/20 13:19	1
<b>Radium-226</b>	<b>0.323</b>		0.140	0.145	0.200	0.0586	pCi/g	11/24/20 16:52	12/15/20 13:19	1
<b>Radium-228</b>	<b>0.188</b>		0.188	0.189		0.0963	pCi/g	11/24/20 16:52	12/15/20 13:19	1
<b>Thallium-208</b>	<b>0.126</b>		0.0638	0.0654		0.0380	pCi/g	11/24/20 16:52	12/15/20 13:19	1
<b>Thorium 228</b>	<b>0.218</b>		0.0689	0.0735		0.0366	pCi/g	11/24/20 16:52	12/15/20 13:19	1
<b>Thorium-232</b>	<b>0.188</b>		0.188	0.189		0.0963	pCi/g	11/24/20 16:52	12/15/20 13:19	1
Thorium-234	0.257	U	0.616	0.617		0.366	pCi/g	11/24/20 16:52	12/15/20 13:19	1
Uranium-235	0.0729	U	0.175	0.175		0.430	pCi/g	11/24/20 16:52	12/15/20 13:19	1
Uranium-238	0.257	U	0.616	0.617		0.366	pCi/g	11/24/20 16:52	12/15/20 13:19	1

**Client Sample ID: HPPG-SFU-TU099A-003**

**Lab Sample ID: 160-40480-5**

Date Collected: 11/18/20 08:38

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.224</b>		0.179	0.180		0.114	pCi/g	11/24/20 16:52	12/15/20 12:54	1
Actinium-227	0.179	U	0.392	0.392		0.230	pCi/g	11/24/20 16:52	12/15/20 12:54	1
Bismuth-212	-0.00399	U	0.500	0.500		0.415	pCi/g	11/24/20 16:52	12/15/20 12:54	1
<b>Bismuth-214</b>	<b>0.193</b>		0.143	0.145		0.0811	pCi/g	11/24/20 16:52	12/15/20 12:54	1
Cesium-137	-0.0151	U	0.0542	0.0542	0.0700	0.0463	pCi/g	11/24/20 16:52	12/15/20 12:54	1
Lead-210	-0.223	U	1.05	1.05		0.768	pCi/g	11/24/20 16:52	12/15/20 12:54	1
<b>Lead-212</b>	<b>0.336</b>		0.0757	0.0873		0.0257	pCi/g	11/24/20 16:52	12/15/20 12:54	1
<b>Lead-214</b>	<b>0.267</b>		0.106	0.110		0.0647	pCi/g	11/24/20 16:52	12/15/20 12:54	1
<b>Potassium-40</b>	<b>6.76</b>		1.36	1.53		0.255	pCi/g	11/24/20 16:52	12/15/20 12:54	1
Protactinium-231	0.617	U	1.73	1.73		1.39	pCi/g	11/24/20 16:52	12/15/20 12:54	1
Protactinium-234	0.00539	U	0.0111	0.0111		0.141	pCi/g	11/24/20 16:52	12/15/20 12:54	1
<b>Radium-226</b>	<b>0.193</b>		0.143	0.145	0.200	0.0811	pCi/g	11/24/20 16:52	12/15/20 12:54	1
<b>Radium-228</b>	<b>0.224</b>		0.179	0.180		0.114	pCi/g	11/24/20 16:52	12/15/20 12:54	1
<b>Thallium-208</b>	<b>0.101</b>		0.0942	0.0948		0.0287	pCi/g	11/24/20 16:52	12/15/20 12:54	1
<b>Thorium 228</b>	<b>0.336</b>		0.0757	0.0873		0.0257	pCi/g	11/24/20 16:52	12/15/20 12:54	1
<b>Thorium-232</b>	<b>0.224</b>		0.179	0.180		0.114	pCi/g	11/24/20 16:52	12/15/20 12:54	1
Thorium-234	0.221	U	0.333	0.334		0.287	pCi/g	11/24/20 16:52	12/15/20 12:54	1
Uranium-235	0.0608	U	0.161	0.161		0.242	pCi/g	11/24/20 16:52	12/15/20 12:54	1
Uranium-238	0.221	U	0.333	0.334		0.287	pCi/g	11/24/20 16:52	12/15/20 12:54	1

**Client Sample ID: HPPG-SFU-TU099A-004**

**Lab Sample ID: 160-40480-6**

Date Collected: 11/18/20 08:41

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.338</b>		0.189	0.192		0.125	pCi/g	11/24/20 16:52	12/15/20 13:22	1
Actinium-227	0.102	U	0.298	0.298		0.255	pCi/g	11/24/20 16:52	12/15/20 13:22	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-004**

**Lab Sample ID: 160-40480-6**

Date Collected: 11/18/20 08:41

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.0455	U	0.662	0.662		0.540	pCi/g	11/24/20 16:52	12/15/20 13:22	1
<b>Bismuth-214</b>	<b>0.282</b>		0.0943	0.0986		0.0351	pCi/g	11/24/20 16:52	12/15/20 13:22	1
Cesium-137	0.0248	U	0.0532	0.0533	0.0700	0.0409	pCi/g	11/24/20 16:52	12/15/20 13:22	1
Lead-210	0.241	U	1.16	1.16		0.855	pCi/g	11/24/20 16:52	12/15/20 13:22	1
<b>Lead-212</b>	<b>0.259</b>		0.0680	0.0732		0.0328	pCi/g	11/24/20 16:52	12/15/20 13:22	1
<b>Lead-214</b>	<b>0.379</b>		0.102	0.109		0.0550	pCi/g	11/24/20 16:52	12/15/20 13:22	1
<b>Potassium-40</b>	<b>4.89</b>		1.41	1.49		0.493	pCi/g	11/24/20 16:52	12/15/20 13:22	1
Protactinium-231	-0.785	U	2.68	2.68		2.18	pCi/g	11/24/20 16:52	12/15/20 13:22	1
Protactinium-234	0.0245	U	0.0470	0.0471		0.208	pCi/g	11/24/20 16:52	12/15/20 13:22	1
<b>Radium-226</b>	<b>0.282</b>		0.0943	0.0986	0.200	0.0351	pCi/g	11/24/20 16:52	12/15/20 13:22	1
<b>Radium-228</b>	<b>0.338</b>		0.189	0.192		0.125	pCi/g	11/24/20 16:52	12/15/20 13:22	1
<b>Thallium-208</b>	<b>0.137</b>		0.0654	0.0669		0.0282	pCi/g	11/24/20 16:52	12/15/20 13:22	1
<b>Thorium 228</b>	<b>0.259</b>		0.0680	0.0732		0.0328	pCi/g	11/24/20 16:52	12/15/20 13:22	1
<b>Thorium-232</b>	<b>0.338</b>		0.189	0.192		0.125	pCi/g	11/24/20 16:52	12/15/20 13:22	1
Thorium-234	-0.889	U	0.495	0.505		0.692	pCi/g	11/24/20 16:52	12/15/20 13:22	1
Uranium-235	-0.184	U	0.268	0.268		0.392	pCi/g	11/24/20 16:52	12/15/20 13:22	1
Uranium-238	-0.889	U	0.495	0.505		0.692	pCi/g	11/24/20 16:52	12/15/20 13:22	1

**Client Sample ID: HPPG-SFU-TU099A-005**

**Lab Sample ID: 160-40480-7**

Date Collected: 11/18/20 08:46

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.186	U	0.0903	0.0928		0.187	pCi/g	11/25/20 12:41	12/16/20 09:41	1
Actinium-227	0.0599	U	0.109	0.109		0.383	pCi/g	11/25/20 12:41	12/16/20 09:41	1
Bismuth-212	0.435	U	1.02	1.02		0.808	pCi/g	11/25/20 12:41	12/16/20 09:41	1
<b>Bismuth-214</b>	<b>0.333</b>		0.135	0.140		0.0527	pCi/g	11/25/20 12:41	12/16/20 09:41	1
<b>Cesium-137</b>	<b>0.0343</b>		0.0637	0.0638	0.0700	0.0338	pCi/g	11/25/20 12:41	12/16/20 09:41	1
Lead-210	0.452	U	1.35	1.35		0.961	pCi/g	11/25/20 12:41	12/16/20 09:41	1
<b>Lead-212</b>	<b>0.214</b>		0.0782	0.0821		0.0455	pCi/g	11/25/20 12:41	12/16/20 09:41	1
<b>Lead-214</b>	<b>0.370</b>		0.118	0.125		0.0496	pCi/g	11/25/20 12:41	12/16/20 09:41	1
<b>Potassium-40</b>	<b>7.93</b>		1.40	1.67		0.301	pCi/g	11/25/20 12:41	12/16/20 09:41	1
Protactinium-231	-0.917	U	3.04	3.04		2.47	pCi/g	11/25/20 12:41	12/16/20 09:41	1
Protactinium-234	-0.122	U	0.344	0.344		0.280	pCi/g	11/25/20 12:41	12/16/20 09:41	1
<b>Radium-226</b>	<b>0.333</b>		0.135	0.140	0.200	0.0527	pCi/g	11/25/20 12:41	12/16/20 09:41	1
Radium-228	0.186	U	0.0903	0.0928		0.187	pCi/g	11/25/20 12:41	12/16/20 09:41	1
<b>Thallium-208</b>	<b>0.127</b>		0.0571	0.0589		0.0235	pCi/g	11/25/20 12:41	12/16/20 09:41	1
<b>Thorium 228</b>	<b>0.214</b>		0.0782	0.0821		0.0455	pCi/g	11/25/20 12:41	12/16/20 09:41	1
Thorium-232	0.186	U	0.0903	0.0928		0.187	pCi/g	11/25/20 12:41	12/16/20 09:41	1
Thorium-234	-0.935	U	0.913	0.920		0.829	pCi/g	11/25/20 12:41	12/16/20 09:41	1
Uranium-235	-0.240	U	0.485	0.486		0.539	pCi/g	11/25/20 12:41	12/16/20 09:41	1
Uranium-238	-0.935	U	0.913	0.920		0.829	pCi/g	11/25/20 12:41	12/16/20 09:41	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-006**

**Lab Sample ID: 160-40480-8**

Date Collected: 11/18/20 08:49

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.281</b>		0.105	0.108		0.0618	pCi/g	11/25/20 12:41	12/16/20 09:44	1
Actinium-227	0.0534	U	0.208	0.209		0.242	pCi/g	11/25/20 12:41	12/16/20 09:44	1
Bismuth-212	0.150	U	0.532	0.532		0.425	pCi/g	11/25/20 12:41	12/16/20 09:44	1
<b>Bismuth-214</b>	<b>0.294</b>		0.0830	0.0884		0.0343	pCi/g	11/25/20 12:41	12/16/20 09:44	1
Cesium-137	0.0160	U	0.0421	0.0422	0.0700	0.0333	pCi/g	11/25/20 12:41	12/16/20 09:44	1
Lead-210	0.488	U	1.08	1.08		0.868	pCi/g	11/25/20 12:41	12/16/20 09:44	1
<b>Lead-212</b>	<b>0.344</b>		0.0882	0.0988		0.0573	pCi/g	11/25/20 12:41	12/16/20 09:44	1
<b>Lead-214</b>	<b>0.278</b>		0.0782	0.0834		0.0369	pCi/g	11/25/20 12:41	12/16/20 09:44	1
<b>Potassium-40</b>	<b>6.36</b>		0.958	1.16		0.219	pCi/g	11/25/20 12:41	12/16/20 09:44	1
Protactinium-231	-0.669	U	2.05	2.05		1.67	pCi/g	11/25/20 12:41	12/16/20 09:44	1
Protactinium-234	0.0553	U	0.101	0.101		0.150	pCi/g	11/25/20 12:41	12/16/20 09:44	1
<b>Radium-226</b>	<b>0.294</b>		0.0830	0.0884	0.200	0.0343	pCi/g	11/25/20 12:41	12/16/20 09:44	1
<b>Radium-228</b>	<b>0.281</b>		0.105	0.108		0.0618	pCi/g	11/25/20 12:41	12/16/20 09:44	1
<b>Thallium-208</b>	<b>0.101</b>		0.0371	0.0386		0.0149	pCi/g	11/25/20 12:41	12/16/20 09:44	1
<b>Thorium 228</b>	<b>0.344</b>		0.0882	0.0988		0.0573	pCi/g	11/25/20 12:41	12/16/20 09:44	1
<b>Thorium-232</b>	<b>0.281</b>		0.105	0.108		0.0618	pCi/g	11/25/20 12:41	12/16/20 09:44	1
Thorium-234	-0.260	U	0.875	0.875		0.715	pCi/g	11/25/20 12:41	12/16/20 09:44	1
Uranium-235	0.000	U	0.149	0.149		0.257	pCi/g	11/25/20 12:41	12/16/20 09:44	1
Uranium-238	-0.260	U	0.875	0.875		0.715	pCi/g	11/25/20 12:41	12/16/20 09:44	1

**Client Sample ID: HPPG-SFU-TU099A-007**

**Lab Sample ID: 160-40480-9**

Date Collected: 11/18/20 08:52

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.314</b>		0.187	0.190		0.112	pCi/g	11/25/20 12:41	12/16/20 09:42	1
Actinium-227	0.0977	U	0.438	0.438		0.266	pCi/g	11/25/20 12:41	12/16/20 09:42	1
Bismuth-212	-0.328	U	0.858	0.859		0.599	pCi/g	11/25/20 12:41	12/16/20 09:42	1
<b>Bismuth-214</b>	<b>0.256</b>		0.129	0.131		0.0641	pCi/g	11/25/20 12:41	12/16/20 09:42	1
Cesium-137	0.00803	U	0.0695	0.0695	0.0700	0.0563	pCi/g	11/25/20 12:41	12/16/20 09:42	1
Lead-210	0.307	U	1.07	1.07		0.750	pCi/g	11/25/20 12:41	12/16/20 09:42	1
Lead-212	0.0255	U	0.114	0.114		0.0929	pCi/g	11/25/20 12:41	12/16/20 09:42	1
<b>Lead-214</b>	<b>0.250</b>		0.0978	0.101		0.0614	pCi/g	11/25/20 12:41	12/16/20 09:42	1
<b>Potassium-40</b>	<b>6.16</b>		1.29	1.43		0.249	pCi/g	11/25/20 12:41	12/16/20 09:42	1
Protactinium-231	0.000	U	0.436	0.436		1.67	pCi/g	11/25/20 12:41	12/16/20 09:42	1
Protactinium-234	-0.0702	U	0.193	0.193		0.155	pCi/g	11/25/20 12:41	12/16/20 09:42	1
<b>Radium-226</b>	<b>0.256</b>		0.129	0.131	0.200	0.0641	pCi/g	11/25/20 12:41	12/16/20 09:42	1
<b>Radium-228</b>	<b>0.314</b>		0.187	0.190		0.112	pCi/g	11/25/20 12:41	12/16/20 09:42	1
<b>Thallium-208</b>	<b>0.0883</b>		0.0546	0.0554		0.0329	pCi/g	11/25/20 12:41	12/16/20 09:42	1
Thorium 228	0.0255	U	0.114	0.114		0.0929	pCi/g	11/25/20 12:41	12/16/20 09:42	1
<b>Thorium-232</b>	<b>0.314</b>		0.187	0.190		0.112	pCi/g	11/25/20 12:41	12/16/20 09:42	1
Thorium-234	-0.360	U	0.610	0.611		0.686	pCi/g	11/25/20 12:41	12/16/20 09:42	1
Uranium-235	-0.161	U	0.326	0.327		0.321	pCi/g	11/25/20 12:41	12/16/20 09:42	1
Uranium-238	-0.360	U	0.610	0.611		0.686	pCi/g	11/25/20 12:41	12/16/20 09:42	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-008**

**Lab Sample ID: 160-40480-10**

Date Collected: 11/18/20 08:55

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.209</b>		0.0820	0.0848		0.0187	pCi/g	11/25/20 12:41	12/16/20 09:46	1
Actinium-227	0.0374	U	0.0667	0.0669		0.261	pCi/g	11/25/20 12:41	12/16/20 09:46	1
Bismuth-212	0.000	U	0.337	0.337		0.348	pCi/g	11/25/20 12:41	12/16/20 09:46	1
<b>Bismuth-214</b>	<b>0.212</b>		0.0717	0.0750		0.0339	pCi/g	11/25/20 12:41	12/16/20 09:46	1
Cesium-137	-0.0105	U	0.0371	0.0371	0.0700	0.0295	pCi/g	11/25/20 12:41	12/16/20 09:46	1
Lead-210	-0.511	U	1.11	1.11		0.890	pCi/g	11/25/20 12:41	12/16/20 09:46	1
<b>Lead-212</b>	<b>0.236</b>		0.0513	0.0597		0.0216	pCi/g	11/25/20 12:41	12/16/20 09:46	1
<b>Lead-214</b>	<b>0.174</b>		0.0686	0.0709		0.0359	pCi/g	11/25/20 12:41	12/16/20 09:46	1
<b>Potassium-40</b>	<b>6.64</b>		0.918	1.14		0.0740	pCi/g	11/25/20 12:41	12/16/20 09:46	1
Protactinium-231	0.222	U	0.749	0.749		1.30	pCi/g	11/25/20 12:41	12/16/20 09:46	1
Protactinium-234	0.00614	U	0.0120	0.0120		0.155	pCi/g	11/25/20 12:41	12/16/20 09:46	1
<b>Radium-226</b>	<b>0.212</b>		0.0717	0.0750	0.200	0.0339	pCi/g	11/25/20 12:41	12/16/20 09:46	1
<b>Radium-228</b>	<b>0.209</b>		0.0820	0.0848		0.0187	pCi/g	11/25/20 12:41	12/16/20 09:46	1
<b>Thallium-208</b>	<b>0.0750</b>		0.0475	0.0482		0.0198	pCi/g	11/25/20 12:41	12/16/20 09:46	1
<b>Thorium 228</b>	<b>0.236</b>		0.0513	0.0597		0.0216	pCi/g	11/25/20 12:41	12/16/20 09:46	1
<b>Thorium-232</b>	<b>0.209</b>		0.0820	0.0848		0.0187	pCi/g	11/25/20 12:41	12/16/20 09:46	1
Thorium-234	-0.0347	U	0.843	0.843		0.693	pCi/g	11/25/20 12:41	12/16/20 09:46	1
Uranium-235	0.130	U	0.225	0.226		0.230	pCi/g	11/25/20 12:41	12/16/20 09:46	1
Uranium-238	-0.0347	U	0.843	0.843		0.693	pCi/g	11/25/20 12:41	12/16/20 09:46	1

**Client Sample ID: HPPG-SFU-TU099A-009**

**Lab Sample ID: 160-40480-11**

Date Collected: 11/18/20 08:59

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.248</b>		0.148	0.150		0.0640	pCi/g	11/25/20 12:41	12/16/20 09:45	1
Actinium-227	0.0276	U	0.0618	0.0618		0.319	pCi/g	11/25/20 12:41	12/16/20 09:45	1
Bismuth-212	-0.431	U	0.828	0.830		0.647	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Bismuth-214</b>	<b>0.146</b>		0.0883	0.0896		0.136	pCi/g	11/25/20 12:41	12/16/20 09:45	1
Cesium-137	-0.0398	U	0.0830	0.0831	0.0700	0.0657	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Lead-210</b>	<b>0.991</b>		1.12	1.12		0.784	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Lead-212</b>	<b>0.296</b>		0.0936	0.0985		0.0447	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Lead-214</b>	<b>0.354</b>		0.104	0.110		0.0398	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Potassium-40</b>	<b>7.67</b>		1.21	1.44		0.111	pCi/g	11/25/20 12:41	12/16/20 09:45	1
Protactinium-231	0.626	U	1.60	1.60		1.76	pCi/g	11/25/20 12:41	12/16/20 09:45	1
Protactinium-234	0.0847	U	0.257	0.257		0.209	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Radium-226</b>	<b>0.146</b>		0.0883	0.0896	0.200	0.136	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Radium-228</b>	<b>0.248</b>		0.148	0.150		0.0640	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Thallium-208</b>	<b>0.101</b>		0.0560	0.0569		0.0256	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Thorium 228</b>	<b>0.296</b>		0.0936	0.0985		0.0447	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Thorium-232</b>	<b>0.248</b>		0.148	0.150		0.0640	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Thorium-234</b>	<b>0.982</b>		0.523	0.534		0.383	pCi/g	11/25/20 12:41	12/16/20 09:45	1
Uranium-235	0.240	U	0.256	0.258		0.289	pCi/g	11/25/20 12:41	12/16/20 09:45	1
<b>Uranium-238</b>	<b>0.982</b>		0.523	0.534		0.383	pCi/g	11/25/20 12:41	12/16/20 09:45	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-010**

**Lab Sample ID: 160-40480-12**

Date Collected: 11/18/20 09:03

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.268</b>		0.105	0.109		0.123	pCi/g	11/25/20 12:41	12/16/20 10:23	1
Actinium-227	0.0153	U	0.0535	0.0535		0.309	pCi/g	11/25/20 12:41	12/16/20 10:23	1
Bismuth-212	0.0119	U	0.616	0.616		0.506	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Bismuth-214</b>	<b>0.290</b>		0.101	0.106		0.0338	pCi/g	11/25/20 12:41	12/16/20 10:23	1
Cesium-137	-0.0169	U	0.0540	0.0540	0.0700	0.0430	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Lead-210</b>	<b>1.11</b>		1.13	1.14		0.726	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Lead-212</b>	<b>0.276</b>		0.0742	0.0823		0.0414	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Lead-214</b>	<b>0.278</b>		0.0817	0.0867		0.0433	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Potassium-40</b>	<b>7.05</b>		1.12	1.33		0.262	pCi/g	11/25/20 12:41	12/16/20 10:23	1
Protactinium-231	0.000	U	0.351	0.351		1.78	pCi/g	11/25/20 12:41	12/16/20 10:23	1
Protactinium-234	0.0100	U	0.0155	0.0155		0.168	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Radium-226</b>	<b>0.290</b>		0.101	0.106	0.200	0.0338	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Radium-228</b>	<b>0.268</b>		0.105	0.109		0.123	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Thallium-208</b>	<b>0.126</b>		0.0572	0.0586		0.0250	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Thorium 228</b>	<b>0.276</b>		0.0742	0.0823		0.0414	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Thorium-232</b>	<b>0.268</b>		0.105	0.109		0.123	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Thorium-234</b>	<b>0.373</b>		0.396	0.399		0.312	pCi/g	11/25/20 12:41	12/16/20 10:23	1
Uranium-235	-0.00582	U	0.207	0.207		0.170	pCi/g	11/25/20 12:41	12/16/20 10:23	1
<b>Uranium-238</b>	<b>0.373</b>		0.396	0.399		0.312	pCi/g	11/25/20 12:41	12/16/20 10:23	1

**Client Sample ID: HPPG-SFU-TU099A-011**

**Lab Sample ID: 160-40480-13**

Date Collected: 11/18/20 09:07

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Strontium-90	-0.0764	U	0.115	0.115	0.331	0.102	pCi/g	12/01/20 10:36	12/10/20 17:32	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>	
Sr Carrier	102		40 - 110				12/01/20 10:36	12/10/20 17:32	1	
Y Carrier	90.5		40 - 110				12/01/20 10:36	12/10/20 17:32	1	

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.459</b>		0.126	0.134		0.0264	pCi/g	11/25/20 12:41	12/16/20 10:21	1
Actinium-227	0.0503	U	0.210	0.210		0.301	pCi/g	11/25/20 12:41	12/16/20 10:21	1
Bismuth-212	0.245	U	0.602	0.603		0.471	pCi/g	11/25/20 12:41	12/16/20 10:21	1
<b>Bismuth-214</b>	<b>0.328</b>		0.108	0.114		0.0456	pCi/g	11/25/20 12:41	12/16/20 10:21	1
Cesium-137	-0.0197	U	0.0586	0.0586	0.0700	0.0466	pCi/g	11/25/20 12:41	12/16/20 10:21	1
<b>Lead-210</b>	<b>1.11</b>		1.30	1.31		0.828	pCi/g	11/25/20 12:41	12/16/20 10:21	1
<b>Lead-212</b>	<b>0.267</b>		0.0700	0.0780		0.0346	pCi/g	11/25/20 12:41	12/16/20 10:21	1
<b>Lead-214</b>	<b>0.244</b>		0.0752	0.0794		0.0440	pCi/g	11/25/20 12:41	12/16/20 10:21	1
<b>Potassium-40</b>	<b>7.00</b>		1.15	1.36		0.245	pCi/g	11/25/20 12:41	12/16/20 10:21	1
Protactinium-231	-0.650	U	2.29	2.29		1.86	pCi/g	11/25/20 12:41	12/16/20 10:21	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-011**

**Lab Sample ID: 160-40480-13**

Date Collected: 11/18/20 09:07

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0528	U	0.0615	0.0617		0.219	pCi/g	11/25/20 12:41	12/16/20 10:21	1
<b>Radium-226</b>	<b>0.328</b>		0.108	0.114	0.200	0.0456	pCi/g	11/25/20 12:41	12/16/20 10:21	1
<b>Radium-228</b>	<b>0.459</b>		0.126	0.134		0.0264	pCi/g	11/25/20 12:41	12/16/20 10:21	1
<b>Thallium-208</b>	<b>0.0817</b>		0.0612	0.0618		0.0304	pCi/g	11/25/20 12:41	12/16/20 10:21	1
<b>Thorium 228</b>	<b>0.267</b>		0.0700	0.0780		0.0346	pCi/g	11/25/20 12:41	12/16/20 10:21	1
<b>Thorium-232</b>	<b>0.459</b>		0.126	0.134		0.0264	pCi/g	11/25/20 12:41	12/16/20 10:21	1
Thorium-234	-0.749	U	0.537	0.543		0.734	pCi/g	11/25/20 12:41	12/16/20 10:21	1
Uranium-235	0.0994	U	0.237	0.237		0.258	pCi/g	11/25/20 12:41	12/16/20 10:21	1
Uranium-238	-0.749	U	0.537	0.543		0.734	pCi/g	11/25/20 12:41	12/16/20 10:21	1

**Client Sample ID: HPPG-SFU-TU099A-012**

**Lab Sample ID: 160-40480-14**

Date Collected: 11/18/20 09:10

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.139	U	0.0565	0.0583		0.219	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Actinium-227	0.150	U	0.387	0.387		0.342	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Bismuth-212	-0.563	U	0.737	0.739		0.764	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Bismuth-214	0.136	U	0.118	0.119		0.190	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Cesium-137	-0.00711	U	0.0705	0.0705	0.0700	0.0586	pCi/g	11/25/20 12:41	12/16/20 10:30	1
<b>Lead-210</b>	<b>1.00</b>		1.16	1.17		0.736	pCi/g	11/25/20 12:41	12/16/20 10:30	1
<b>Lead-212</b>	<b>0.298</b>		0.0883	0.0963		0.0459	pCi/g	11/25/20 12:41	12/16/20 10:30	1
<b>Lead-214</b>	<b>0.271</b>		0.107	0.111		0.0786	pCi/g	11/25/20 12:41	12/16/20 10:30	1
<b>Potassium-40</b>	<b>5.84</b>		1.34	1.47		0.282	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Protactinium-231	0.392	U	1.50	1.50		1.65	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Protactinium-234	0.0696	U	0.157	0.157		0.151	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Radium-226	0.136	U	0.118	0.119	0.200	0.190	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Radium-228	0.139	U	0.0565	0.0583		0.219	pCi/g	11/25/20 12:41	12/16/20 10:30	1
<b>Thallium-208</b>	<b>0.116</b>		0.0558	0.0571		0.0228	pCi/g	11/25/20 12:41	12/16/20 10:30	1
<b>Thorium 228</b>	<b>0.298</b>		0.0883	0.0963		0.0459	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Thorium-232	0.139	U	0.0565	0.0583		0.219	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Thorium-234	0.276	U	0.414	0.416		0.345	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Uranium-235	-0.156	U	0.237	0.237		0.320	pCi/g	11/25/20 12:41	12/16/20 10:30	1
Uranium-238	0.276	U	0.414	0.416		0.345	pCi/g	11/25/20 12:41	12/16/20 10:30	1

**Client Sample ID: HPPG-SFU-TU099A-013**

**Lab Sample ID: 160-40480-15**

Date Collected: 11/18/20 09:14

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	<b>0.181</b>		0.105	0.106		0.0454	pCi/g	11/25/20 12:41	12/16/20 10:27	1
Actinium-227	0.121	U	0.247	0.247		0.213	pCi/g	11/25/20 12:41	12/16/20 10:27	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-013**

**Lab Sample ID: 160-40480-15**

Date Collected: 11/18/20 09:14

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.360	U	0.405	0.407		0.429	pCi/g	11/25/20 12:41	12/16/20 10:27	1
<b>Bismuth-214</b>	<b>0.253</b>		0.0813	0.0854		0.0357	pCi/g	11/25/20 12:41	12/16/20 10:27	1
Cesium-137	-0.0280	U	0.0459	0.0460	0.0700	0.0354	pCi/g	11/25/20 12:41	12/16/20 10:27	1
Lead-210	-0.601	U	1.11	1.12		0.888	pCi/g	11/25/20 12:41	12/16/20 10:27	1
<b>Lead-212</b>	<b>0.248</b>		0.0616	0.0695		0.0271	pCi/g	11/25/20 12:41	12/16/20 10:27	1
<b>Lead-214</b>	<b>0.260</b>		0.0954	0.0991		0.0611	pCi/g	11/25/20 12:41	12/16/20 10:27	1
<b>Potassium-40</b>	<b>6.89</b>		1.02	1.24		0.228	pCi/g	11/25/20 12:41	12/16/20 10:27	1
Protactinium-231	0.510	U	1.25	1.25		1.37	pCi/g	11/25/20 12:41	12/16/20 10:27	1
Protactinium-234	-0.0124	U	0.0231	0.0231		0.170	pCi/g	11/25/20 12:41	12/16/20 10:27	1
<b>Radium-226</b>	<b>0.253</b>		0.0813	0.0854	0.200	0.0357	pCi/g	11/25/20 12:41	12/16/20 10:27	1
<b>Radium-228</b>	<b>0.181</b>		0.105	0.106		0.0454	pCi/g	11/25/20 12:41	12/16/20 10:27	1
<b>Thallium-208</b>	<b>0.0962</b>		0.0349	0.0363		0.0131	pCi/g	11/25/20 12:41	12/16/20 10:27	1
<b>Thorium 228</b>	<b>0.248</b>		0.0616	0.0695		0.0271	pCi/g	11/25/20 12:41	12/16/20 10:27	1
<b>Thorium-232</b>	<b>0.181</b>		0.105	0.106		0.0454	pCi/g	11/25/20 12:41	12/16/20 10:27	1
Thorium-234	-0.0209	U	0.0433	0.0434		0.882	pCi/g	11/25/20 12:41	12/16/20 10:27	1
Uranium-235	-0.0456	U	0.403	0.403		0.331	pCi/g	11/25/20 12:41	12/16/20 10:27	1
Uranium-238	-0.0209	U	0.0433	0.0434		0.882	pCi/g	11/25/20 12:41	12/16/20 10:27	1

**Client Sample ID: HPPG-SFU-TU099A-014**

**Lab Sample ID: 160-40480-16**

Date Collected: 11/18/20 09:17

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.494</b>		0.104	0.116		0.0273	pCi/g	11/25/20 12:41	12/16/20 10:28	1
Actinium-227	0.164	U	0.390	0.390		0.292	pCi/g	11/25/20 12:41	12/16/20 10:28	1
Bismuth-212	0.356	U	0.585	0.586		0.442	pCi/g	11/25/20 12:41	12/16/20 10:28	1
<b>Bismuth-214</b>	<b>0.177</b>		0.106	0.107		0.0583	pCi/g	11/25/20 12:41	12/16/20 10:28	1
Cesium-137	-0.0463	U	0.0798	0.0800	0.0700	0.0627	pCi/g	11/25/20 12:41	12/16/20 10:28	1
Lead-210	-1.03	U	1.48	1.49		1.26	pCi/g	11/25/20 12:41	12/16/20 10:28	1
<b>Lead-212</b>	<b>0.231</b>		0.0722	0.0761		0.0408	pCi/g	11/25/20 12:41	12/16/20 10:28	1
<b>Lead-214</b>	<b>0.258</b>		0.132	0.134		0.0625	pCi/g	11/25/20 12:41	12/16/20 10:28	1
<b>Potassium-40</b>	<b>6.04</b>		1.05	1.21		0.106	pCi/g	11/25/20 12:41	12/16/20 10:28	1
Protactinium-231	-0.123	U	2.91	2.91		2.39	pCi/g	11/25/20 12:41	12/16/20 10:28	1
Protactinium-234	0.119	U	0.220	0.221		0.183	pCi/g	11/25/20 12:41	12/16/20 10:28	1
<b>Radium-226</b>	<b>0.177</b>		0.106	0.107	0.200	0.0583	pCi/g	11/25/20 12:41	12/16/20 10:28	1
<b>Radium-228</b>	<b>0.494</b>		0.104	0.116		0.0273	pCi/g	11/25/20 12:41	12/16/20 10:28	1
Thallium-208	0.0398	U	0.0751	0.0752		0.0399	pCi/g	11/25/20 12:41	12/16/20 10:28	1
<b>Thorium 228</b>	<b>0.231</b>		0.0722	0.0761		0.0408	pCi/g	11/25/20 12:41	12/16/20 10:28	1
<b>Thorium-232</b>	<b>0.494</b>		0.104	0.116		0.0273	pCi/g	11/25/20 12:41	12/16/20 10:28	1
<b>Thorium-234</b>	<b>0.445</b>		0.458	0.461		0.324	pCi/g	11/25/20 12:41	12/16/20 10:28	1
Uranium-235	0.0285	U	0.200	0.200		0.341	pCi/g	11/25/20 12:41	12/16/20 10:28	1
<b>Uranium-238</b>	<b>0.445</b>		0.458	0.461		0.324	pCi/g	11/25/20 12:41	12/16/20 10:28	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-015**

**Lab Sample ID: 160-40480-17**

Date Collected: 11/18/20 09:21

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.174</b>		0.127	0.129		0.0604	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Actinium-227	0.176	U	0.318	0.318		0.226	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Bismuth-212	-0.0456	U	0.644	0.644		0.527	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Bismuth-214</b>	<b>0.269</b>		0.0968	0.101		0.0408	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Cesium-137	0.00437	U	0.0327	0.0327	0.0700	0.0265	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Lead-210	-0.460	U	1.08	1.08		0.866	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Lead-212</b>	<b>0.201</b>		0.0496	0.0560		0.0227	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Lead-214</b>	<b>0.229</b>		0.0646	0.0688		0.0338	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Potassium-40</b>	<b>6.24</b>		0.899	1.10		0.0754	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Protactinium-231	0.365	U	1.32	1.32		1.31	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Protactinium-234	-0.0250	U	0.0693	0.0694		0.157	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Radium-226</b>	<b>0.269</b>		0.0968	0.101	0.200	0.0408	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Radium-228</b>	<b>0.174</b>		0.127	0.129		0.0604	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Thallium-208</b>	<b>0.0862</b>		0.0297	0.0310		0.00809	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Thorium 228</b>	<b>0.201</b>		0.0496	0.0560		0.0227	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Thorium-232</b>	<b>0.174</b>		0.127	0.129		0.0604	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Thorium-234	0.104	U	0.258	0.258		0.709	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Uranium-235	0.000	U	0.123	0.123		0.271	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Uranium-238	0.104	U	0.258	0.258		0.709	pCi/g	11/25/20 12:41	12/16/20 10:29	1

**Client Sample ID: HPPG-SFU-TU099A-016**

**Lab Sample ID: 160-40480-18**

Date Collected: 11/18/20 09:24

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.287</b>		0.158	0.162		0.121	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Actinium-227	-0.268	U	0.520	0.521		0.387	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Bismuth-212	0.305	U	0.658	0.659		0.508	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Bismuth-214	-0.0309	U	0.202	0.202		0.167	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Cesium-137	-0.0363	U	0.0623	0.0624	0.0700	0.0477	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Lead-210	0.398	U	1.14	1.14		0.842	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Lead-212</b>	<b>0.193</b>		0.0793	0.0825		0.0505	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Lead-214</b>	<b>0.301</b>		0.102	0.108		0.0481	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Potassium-40</b>	<b>7.69</b>		1.31	1.58		0.276	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Protactinium-231	0.613	U	1.78	1.78		1.95	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Protactinium-234	0.123	U	0.221	0.221		0.214	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Radium-226	-0.0309	U	0.202	0.202	0.200	0.167	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Radium-228</b>	<b>0.287</b>		0.158	0.162		0.121	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Thallium-208	0.0250	U	0.0898	0.0899		0.0451	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Thorium 228</b>	<b>0.193</b>		0.0793	0.0825		0.0505	pCi/g	11/25/20 12:41	12/16/20 10:29	1
<b>Thorium-232</b>	<b>0.287</b>		0.158	0.162		0.121	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Thorium-234	-0.876	U	0.578	0.588		0.779	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Uranium-235	-0.190	U	0.309	0.310		0.409	pCi/g	11/25/20 12:41	12/16/20 10:29	1
Uranium-238	-0.876	U	0.578	0.588		0.779	pCi/g	11/25/20 12:41	12/16/20 10:29	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-017**

**Lab Sample ID: 160-40480-19**

Date Collected: 11/18/20 09:27

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.462</b>		0.164	0.171		0.0507	pCi/g	11/25/20 12:41	12/16/20 10:55	1
Actinium-227	0.0439	U	0.0871	0.0873		0.348	pCi/g	11/25/20 12:41	12/16/20 10:55	1
Bismuth-212	0.309	U	0.558	0.559		0.426	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Bismuth-214</b>	<b>0.433</b>		0.106	0.116		0.0252	pCi/g	11/25/20 12:41	12/16/20 10:55	1
Cesium-137	0.0000559	U	0.0684	0.0684	0.0700	0.0563	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Lead-210</b>	<b>1.01</b>		1.16	1.17		0.772	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Lead-212</b>	<b>0.381</b>		0.0761	0.0906		0.0324	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Lead-214</b>	<b>0.345</b>		0.0983	0.105		0.0438	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Potassium-40</b>	<b>8.69</b>		1.26	1.54		0.272	pCi/g	11/25/20 12:41	12/16/20 10:55	1
Protactinium-231	0.000	U	0.275	0.275		2.26	pCi/g	11/25/20 12:41	12/16/20 10:55	1
Protactinium-234	0.0125	U	0.0192	0.0192		0.165	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Radium-226</b>	<b>0.433</b>		0.106	0.116	0.200	0.0252	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Radium-228</b>	<b>0.462</b>		0.164	0.171		0.0507	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Thallium-208</b>	<b>0.0785</b>		0.0555	0.0561		0.0289	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Thorium 228</b>	<b>0.381</b>		0.0761	0.0906		0.0324	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Thorium-232</b>	<b>0.462</b>		0.164	0.171		0.0507	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Thorium-234</b>	<b>0.416</b>		0.462	0.465		0.303	pCi/g	11/25/20 12:41	12/16/20 10:55	1
Uranium-235	0.115	U	0.310	0.311		0.241	pCi/g	11/25/20 12:41	12/16/20 10:55	1
<b>Uranium-238</b>	<b>0.416</b>		0.462	0.465		0.303	pCi/g	11/25/20 12:41	12/16/20 10:55	1

**Client Sample ID: HPPG-SFU-TU099A-018**

**Lab Sample ID: 160-40480-20**

Date Collected: 11/18/20 09:30

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.433</b>		0.155	0.161		0.0479	pCi/g	11/25/20 12:41	12/16/20 11:02	1
Actinium-227	0.134	U	0.295	0.295		0.246	pCi/g	11/25/20 12:41	12/16/20 11:02	1
Bismuth-212	0.215	U	0.522	0.522		0.409	pCi/g	11/25/20 12:41	12/16/20 11:02	1
<b>Bismuth-214</b>	<b>0.339</b>		0.110	0.115		0.0466	pCi/g	11/25/20 12:41	12/16/20 11:02	1
Cesium-137	0.0209	U	0.0391	0.0392	0.0700	0.0300	pCi/g	11/25/20 12:41	12/16/20 11:02	1
Lead-210	-0.646	U	1.21	1.22		0.970	pCi/g	11/25/20 12:41	12/16/20 11:02	1
<b>Lead-212</b>	<b>0.290</b>		0.0660	0.0759		0.0332	pCi/g	11/25/20 12:41	12/16/20 11:02	1
<b>Lead-214</b>	<b>0.388</b>		0.0899	0.0986		0.0467	pCi/g	11/25/20 12:41	12/16/20 11:02	1
<b>Potassium-40</b>	<b>6.73</b>		1.03	1.24		0.240	pCi/g	11/25/20 12:41	12/16/20 11:02	1
Protactinium-231	0.000	U	0.585	0.585		1.61	pCi/g	11/25/20 12:41	12/16/20 11:02	1
Protactinium-234	0.119	U	0.209	0.209		0.149	pCi/g	11/25/20 12:41	12/16/20 11:02	1
<b>Radium-226</b>	<b>0.339</b>		0.110	0.115	0.200	0.0466	pCi/g	11/25/20 12:41	12/16/20 11:02	1
<b>Radium-228</b>	<b>0.433</b>		0.155	0.161		0.0479	pCi/g	11/25/20 12:41	12/16/20 11:02	1
<b>Thallium-208</b>	<b>0.113</b>		0.0398	0.0415		0.0148	pCi/g	11/25/20 12:41	12/16/20 11:02	1
<b>Thorium 228</b>	<b>0.290</b>		0.0660	0.0759		0.0332	pCi/g	11/25/20 12:41	12/16/20 11:02	1
<b>Thorium-232</b>	<b>0.433</b>		0.155	0.161		0.0479	pCi/g	11/25/20 12:41	12/16/20 11:02	1
Thorium-234	-0.00550	U	0.0108	0.0108		0.757	pCi/g	11/25/20 12:41	12/16/20 11:02	1
Uranium-235	-0.127	U	0.364	0.364		0.296	pCi/g	11/25/20 12:41	12/16/20 11:02	1
<b>Uranium-238</b>	<b>-0.00550</b>	U	0.0108	0.0108		0.757	pCi/g	11/25/20 12:41	12/16/20 11:02	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-019**

**Lab Sample ID: 160-40480-21**

Date Collected: 11/18/20 09:32

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.528</b>		0.208	0.215		0.0671	pCi/g	11/25/20 12:41	12/16/20 11:03	1
Actinium-227	0.188	U	0.431	0.431		0.321	pCi/g	11/25/20 12:41	12/16/20 11:03	1
Bismuth-212	-0.452	U	0.771	0.772		0.593	pCi/g	11/25/20 12:41	12/16/20 11:03	1
<b>Bismuth-214</b>	<b>0.333</b>		0.106	0.112		0.0445	pCi/g	11/25/20 12:41	12/16/20 11:03	1
Cesium-137	-0.00116	U	0.0569	0.0569	0.0700	0.0468	pCi/g	11/25/20 12:41	12/16/20 11:03	1
Lead-210	-0.740	U	1.65	1.66		1.39	pCi/g	11/25/20 12:41	12/16/20 11:03	1
<b>Lead-212</b>	<b>0.276</b>		0.0832	0.0881		0.0474	pCi/g	11/25/20 12:41	12/16/20 11:03	1
<b>Lead-214</b>	<b>0.323</b>		0.106	0.111		0.0522	pCi/g	11/25/20 12:41	12/16/20 11:03	1
<b>Potassium-40</b>	<b>5.99</b>		1.09	1.25		0.116	pCi/g	11/25/20 12:41	12/16/20 11:03	1
Protactinium-231	-0.346	U	2.66	2.66		2.18	pCi/g	11/25/20 12:41	12/16/20 11:03	1
Protactinium-234	0.00862	U	0.0160	0.0160		0.259	pCi/g	11/25/20 12:41	12/16/20 11:03	1
<b>Radium-226</b>	<b>0.333</b>		0.106	0.112	0.200	0.0445	pCi/g	11/25/20 12:41	12/16/20 11:03	1
<b>Radium-228</b>	<b>0.528</b>		0.208	0.215		0.0671	pCi/g	11/25/20 12:41	12/16/20 11:03	1
<b>Thallium-208</b>	<b>0.120</b>		0.0484	0.0499		0.0172	pCi/g	11/25/20 12:41	12/16/20 11:03	1
<b>Thorium 228</b>	<b>0.276</b>		0.0832	0.0881		0.0474	pCi/g	11/25/20 12:41	12/16/20 11:03	1
<b>Thorium-232</b>	<b>0.528</b>		0.208	0.215		0.0671	pCi/g	11/25/20 12:41	12/16/20 11:03	1
<b>Thorium-234</b>	<b>0.562</b>		0.603	0.606		0.430	pCi/g	11/25/20 12:41	12/16/20 11:03	1
Uranium-235	0.179	U	0.359	0.360		0.408	pCi/g	11/25/20 12:41	12/16/20 11:03	1
<b>Uranium-238</b>	<b>0.562</b>		0.603	0.606		0.430	pCi/g	11/25/20 12:41	12/16/20 11:03	1

**Client Sample ID: HPPG-SFU-TU099A-020**

**Lab Sample ID: 160-40480-22**

Date Collected: 11/18/20 09:35

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.235</b>		0.0859	0.0892		0.0183	pCi/g	11/25/20 12:41	12/16/20 11:04	1
Actinium-227	0.127	U	0.190	0.190		0.180	pCi/g	11/25/20 12:41	12/16/20 11:04	1
Bismuth-212	-0.160	U	0.489	0.489		0.389	pCi/g	11/25/20 12:41	12/16/20 11:04	1
<b>Bismuth-214</b>	<b>0.152</b>		0.0787	0.0803		0.0399	pCi/g	11/25/20 12:41	12/16/20 11:04	1
Cesium-137	-0.00139	U	0.0341	0.0341	0.0700	0.0280	pCi/g	11/25/20 12:41	12/16/20 11:04	1
Lead-210	0.293	U	0.870	0.871		0.700	pCi/g	11/25/20 12:41	12/16/20 11:04	1
<b>Lead-212</b>	<b>0.149</b>		0.0469	0.0507		0.0259	pCi/g	11/25/20 12:41	12/16/20 11:04	1
<b>Lead-214</b>	<b>0.227</b>		0.0626	0.0670		0.0432	pCi/g	11/25/20 12:41	12/16/20 11:04	1
<b>Potassium-40</b>	<b>6.34</b>		0.886	1.10		0.0721	pCi/g	11/25/20 12:41	12/16/20 11:04	1
Protactinium-231	0.000	U	0.222	0.222		1.26	pCi/g	11/25/20 12:41	12/16/20 11:04	1
Protactinium-234	-0.0000700	U	0.000120	0.000120		0.168	pCi/g	11/25/20 12:41	12/16/20 11:04	1
<b>Radium-226</b>	<b>0.152</b>		0.0787	0.0803	0.200	0.0399	pCi/g	11/25/20 12:41	12/16/20 11:04	1
<b>Radium-228</b>	<b>0.235</b>		0.0859	0.0892		0.0183	pCi/g	11/25/20 12:41	12/16/20 11:04	1
<b>Thallium-208</b>	<b>0.0727</b>		0.0483	0.0489		0.0216	pCi/g	11/25/20 12:41	12/16/20 11:04	1
<b>Thorium 228</b>	<b>0.149</b>		0.0469	0.0507		0.0259	pCi/g	11/25/20 12:41	12/16/20 11:04	1
<b>Thorium-232</b>	<b>0.235</b>		0.0859	0.0892		0.0183	pCi/g	11/25/20 12:41	12/16/20 11:04	1
Thorium-234	-0.0797	U	0.260	0.261		0.578	pCi/g	11/25/20 12:41	12/16/20 11:04	1
Uranium-235	-0.0120	U	0.394	0.394		0.324	pCi/g	11/25/20 12:41	12/16/20 11:04	1
Uranium-238	-0.0797	U	0.260	0.261		0.578	pCi/g	11/25/20 12:41	12/16/20 11:04	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-021**

**Lab Sample ID: 160-40480-23**

Date Collected: 11/18/20 09:37

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Strontium-90	0.0228	U	0.131	0.131	0.331	0.106	pCi/g	12/01/20 10:36	12/10/20 17:32	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	101		40 - 110					12/01/20 10:36	12/10/20 17:32	1
Y Carrier	91.2		40 - 110					12/01/20 10:36	12/10/20 17:32	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.105	U	0.207	0.207		0.121	pCi/g	11/25/20 12:41	12/16/20 11:05	1
Actinium-227	0.221	U	0.450	0.451		0.267	pCi/g	11/25/20 12:41	12/16/20 11:05	1
Bismuth-212	0.457	U	0.841	0.843		0.653	pCi/g	11/25/20 12:41	12/16/20 11:05	1
<b>Bismuth-214</b>	<b>0.210</b>		0.100	0.103		0.0485	pCi/g	11/25/20 12:41	12/16/20 11:05	1
Cesium-137	0.0188	U	0.0494	0.0495	0.0700	0.0384	pCi/g	11/25/20 12:41	12/16/20 11:05	1
Lead-210	0.555	U	1.02	1.02		0.749	pCi/g	11/25/20 12:41	12/16/20 11:05	1
<b>Lead-212</b>	<b>0.192</b>		0.0778	0.0810		0.0372	pCi/g	11/25/20 12:41	12/16/20 11:05	1
<b>Lead-214</b>	<b>0.0819</b>		0.0850	0.0856		0.0745	pCi/g	11/25/20 12:41	12/16/20 11:05	1
<b>Potassium-40</b>	<b>7.25</b>		1.28	1.53		0.277	pCi/g	11/25/20 12:41	12/16/20 11:05	1
Protactinium-231	0.000	U	0.435	0.435		2.02	pCi/g	11/25/20 12:41	12/16/20 11:05	1
Protactinium-234	0.0169	U	0.0307	0.0308		0.252	pCi/g	11/25/20 12:41	12/16/20 11:05	1
<b>Radium-226</b>	<b>0.210</b>		0.100	0.103	0.200	0.0485	pCi/g	11/25/20 12:41	12/16/20 11:05	1
Radium-228	0.105	U	0.207	0.207		0.121	pCi/g	11/25/20 12:41	12/16/20 11:05	1
<b>Thallium-208</b>	<b>0.0417</b>		0.0739	0.0740		0.0391	pCi/g	11/25/20 12:41	12/16/20 11:05	1
<b>Thorium 228</b>	<b>0.192</b>		0.0778	0.0810		0.0372	pCi/g	11/25/20 12:41	12/16/20 11:05	1
Thorium-232	0.105	U	0.207	0.207		0.121	pCi/g	11/25/20 12:41	12/16/20 11:05	1
Thorium-234	0.0839	U	0.123	0.123		0.451	pCi/g	11/25/20 12:41	12/16/20 11:05	1
<b>Uranium-235</b>	<b>0.267</b>		0.203	0.206		0.124	pCi/g	11/25/20 12:41	12/16/20 11:05	1
Uranium-238	0.0839	U	0.123	0.123		0.451	pCi/g	11/25/20 12:41	12/16/20 11:05	1

**Client Sample ID: HPPG-SFU-TU099A-022**

**Lab Sample ID: 160-40480-24**

Date Collected: 11/18/20 09:40

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.178</b>		0.107	0.108		0.130	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Actinium-227	0.191	U	0.342	0.343		0.303	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Bismuth-212	-0.410	U	0.674	0.675		0.650	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Bismuth-214</b>	<b>0.222</b>		0.122	0.124		0.0681	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Cesium-137	0.00636	U	0.0543	0.0543	0.0700	0.0331	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Lead-210	-0.175	U	1.04	1.04		0.757	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Lead-212	0.0175	U	0.100	0.100		0.0814	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Lead-214</b>	<b>0.205</b>		0.0924	0.0949		0.0594	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Potassium-40</b>	<b>6.66</b>		1.30	1.47		0.237	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Protactinium-231	0.485	U	2.05	2.06		1.67	pCi/g	11/25/20 12:41	12/16/20 11:42	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-022**

**Lab Sample ID: 160-40480-24**

Date Collected: 11/18/20 09:40

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	-0.0651	U	0.169	0.169		0.136	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Radium-226</b>	<b>0.222</b>		0.122	0.124	0.200	0.0681	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Radium-228</b>	<b>0.178</b>		0.107	0.108		0.130	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Thallium-208</b>	<b>0.133</b>		0.0549	0.0566		0.0205	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Thorium 228	0.0175	U	0.100	0.100		0.0814	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Thorium-232</b>	<b>0.178</b>		0.107	0.108		0.130	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Thorium-234	-0.595	U	0.499	0.503		0.662	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Uranium-235	0.116	U	0.245	0.245		0.182	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Uranium-238	-0.595	U	0.499	0.503		0.662	pCi/g	11/25/20 12:41	12/16/20 11:42	1

**Client Sample ID: HPPG-SFU-TU099A-023**

**Lab Sample ID: 160-40480-25**

Date Collected: 11/18/20 09:38

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.247</b>		0.0930	0.0964		0.0447	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Actinium-227	-0.273	U	0.270	0.272		0.303	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Bismuth-212	-0.0582	U	0.510	0.510		0.524	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Bismuth-214</b>	<b>0.273</b>		0.0995	0.103		0.0428	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Cesium-137	-0.0153	U	0.0533	0.0534	0.0700	0.0286	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Lead-210	-0.623	U	1.37	1.37		1.11	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Lead-212</b>	<b>0.240</b>		0.0547	0.0629		0.0245	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Lead-214</b>	<b>0.238</b>		0.0927	0.0959		0.0427	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Potassium-40</b>	<b>7.97</b>		1.08	1.35		0.224	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Protactinium-231	0.000	U	0.476	0.476		1.52	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Protactinium-234	-0.0150	U	0.191	0.191		0.157	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Radium-226</b>	<b>0.273</b>		0.0995	0.103	0.200	0.0428	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Radium-228</b>	<b>0.247</b>		0.0930	0.0964		0.0447	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Thallium-208</b>	<b>0.0845</b>		0.0376	0.0386		0.0161	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Thorium 228</b>	<b>0.240</b>		0.0547	0.0629		0.0245	pCi/g	11/25/20 12:41	12/16/20 11:42	1
<b>Thorium-232</b>	<b>0.247</b>		0.0930	0.0964		0.0447	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Thorium-234	0.000	U	0.308	0.308		0.615	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Uranium-235	0.0824	U	0.278	0.278		0.244	pCi/g	11/25/20 12:41	12/16/20 11:42	1
Uranium-238	0.000	U	0.308	0.308		0.615	pCi/g	11/25/20 12:41	12/16/20 11:42	1

**Client Sample ID: HPPG-SFU-TU099A-024**

**Lab Sample ID: 160-40480-26**

Date Collected: 11/18/20 09:42

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.176</b>		0.216	0.216		0.119	pCi/g	11/25/20 14:07	12/16/20 06:22	1
Actinium-227	0.149	U	0.313	0.314		0.303	pCi/g	11/25/20 14:07	12/16/20 06:22	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

**Client Sample ID: HPPG-SFU-TU099A-024**

**Lab Sample ID: 160-40480-26**

Date Collected: 11/18/20 09:42

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.0307	U	0.675	0.675		0.705	pCi/g	11/25/20 14:07	12/16/20 06:22	1
<b>Bismuth-214</b>	<b>0.245</b>		0.120	0.123		0.0682	pCi/g	11/25/20 14:07	12/16/20 06:22	1
Cesium-137	0.00238	U	0.0496	0.0496	0.0700	0.0403	pCi/g	11/25/20 14:07	12/16/20 06:22	1
Lead-210	-0.446	U	1.31	1.31		0.950	pCi/g	11/25/20 14:07	12/16/20 06:22	1
<b>Lead-212</b>	<b>0.226</b>		0.0836	0.0886		0.0498	pCi/g	11/25/20 14:07	12/16/20 06:22	1
<b>Lead-214</b>	<b>0.312</b>		0.120	0.124		0.0676	pCi/g	11/25/20 14:07	12/16/20 06:22	1
<b>Potassium-40</b>	<b>6.89</b>		1.40	1.57		0.265	pCi/g	11/25/20 14:07	12/16/20 06:22	1
Protactinium-231	0.520	U	1.65	1.65		1.81	pCi/g	11/25/20 14:07	12/16/20 06:22	1
Protactinium-234	0.0523	U	0.0684	0.0686		0.180	pCi/g	11/25/20 14:07	12/16/20 06:22	1
<b>Radium-226</b>	<b>0.245</b>		0.120	0.123	0.200	0.0682	pCi/g	11/25/20 14:07	12/16/20 06:22	1
<b>Radium-228</b>	<b>0.176</b>		0.216	0.216		0.119	pCi/g	11/25/20 14:07	12/16/20 06:22	1
<b>Thallium-208</b>	<b>0.116</b>		0.0467	0.0482		0.0147	pCi/g	11/25/20 14:07	12/16/20 06:22	1
<b>Thorium 228</b>	<b>0.226</b>		0.0836	0.0886		0.0498	pCi/g	11/25/20 14:07	12/16/20 06:22	1
<b>Thorium-232</b>	<b>0.176</b>		0.216	0.216		0.119	pCi/g	11/25/20 14:07	12/16/20 06:22	1
Thorium-234	-0.383	U	0.504	0.506		0.697	pCi/g	11/25/20 14:07	12/16/20 06:22	1
Uranium-235	0.0127	U	0.121	0.121		0.255	pCi/g	11/25/20 14:07	12/16/20 06:22	1
Uranium-238	-0.383	U	0.504	0.506		0.697	pCi/g	11/25/20 14:07	12/16/20 06:22	1

**Client Sample ID: HPPG-SFU-TU099A-025**

**Lab Sample ID: 160-40480-27**

Date Collected: 11/18/20 09:45

Matrix: Solid

Date Received: 11/19/20 11:19

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.124</b>		0.211	0.211		0.106	pCi/g	11/25/20 14:07	12/16/20 06:44	1
Actinium-227	0.00280	U	0.0252	0.0252		0.232	pCi/g	11/25/20 14:07	12/16/20 06:44	1
Bismuth-212	-0.209	U	0.385	0.386		0.415	pCi/g	11/25/20 14:07	12/16/20 06:44	1
<b>Bismuth-214</b>	<b>0.218</b>		0.0914	0.0942		0.0403	pCi/g	11/25/20 14:07	12/16/20 06:44	1
Cesium-137	-0.0359	U	0.0574	0.0576	0.0700	0.0450	pCi/g	11/25/20 14:07	12/16/20 06:44	1
Lead-210	-0.0313	U	1.10	1.10		0.906	pCi/g	11/25/20 14:07	12/16/20 06:44	1
<b>Lead-212</b>	<b>0.226</b>		0.0520	0.0596		0.0230	pCi/g	11/25/20 14:07	12/16/20 06:44	1
<b>Lead-214</b>	<b>0.209</b>		0.0729	0.0761		0.0352	pCi/g	11/25/20 14:07	12/16/20 06:44	1
<b>Potassium-40</b>	<b>6.89</b>		0.991	1.22		0.218	pCi/g	11/25/20 14:07	12/16/20 06:44	1
Protactinium-231	0.459	U	1.14	1.14		1.25	pCi/g	11/25/20 14:07	12/16/20 06:44	1
Protactinium-234	0.0622	U	0.114	0.114		0.142	pCi/g	11/25/20 14:07	12/16/20 06:44	1
<b>Radium-226</b>	<b>0.218</b>		0.0914	0.0942	0.200	0.0403	pCi/g	11/25/20 14:07	12/16/20 06:44	1
<b>Radium-228</b>	<b>0.124</b>		0.211	0.211		0.106	pCi/g	11/25/20 14:07	12/16/20 06:44	1
<b>Thallium-208</b>	<b>0.103</b>		0.0351	0.0367		0.0130	pCi/g	11/25/20 14:07	12/16/20 06:44	1
<b>Thorium 228</b>	<b>0.226</b>		0.0520	0.0596		0.0230	pCi/g	11/25/20 14:07	12/16/20 06:44	1
<b>Thorium-232</b>	<b>0.124</b>		0.211	0.211		0.106	pCi/g	11/25/20 14:07	12/16/20 06:44	1
Thorium-234	0.000	U	0.263	0.263		0.627	pCi/g	11/25/20 14:07	12/16/20 06:44	1
Uranium-235	0.000	U	0.102	0.102		0.245	pCi/g	11/25/20 14:07	12/16/20 06:44	1
Uranium-238	0.000	U	0.263	0.263		0.627	pCi/g	11/25/20 14:07	12/16/20 06:44	1

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

## Method: 905 - Strontium-90 (GFPC)

**Lab Sample ID: MB 160-490603/21-A**  
**Matrix: Solid**  
**Analysis Batch: 491401**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 490603**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.1284	U	0.224	0.224	0.331	0.175	pCi/g	12/01/20 10:36	12/10/20 17:33	1
<b>Carrier</b>	<b>MB MB</b>		<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
	<b>%Yield</b>	<b>Qualifier</b>								
Sr Carrier	83.7		40 - 110					12/01/20 10:36	12/10/20 17:33	1
Y Carrier	87.1		40 - 110					12/01/20 10:36	12/10/20 17:33	1

**Lab Sample ID: LCS 160-490603/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491432**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 490603**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Strontium-90	7.76	6.228		0.666	0.331	0.106	pCi/g	80	75 - 125
<b>Carrier</b>	<b>LCS LCS</b>		<b>Limits</b>						
	<b>%Yield</b>	<b>Qualifier</b>							
Sr Carrier	107		40 - 110						
Y Carrier	90.8		40 - 110						

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID: MB 160-490116/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491758**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 490116**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.1584		0.120	0.121		0.0480	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Actinium-227	0.2511	U	0.302	0.303		0.325	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Bismuth-212	0.3500	U	0.660	0.661		0.481	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Bismuth-214	-0.06406	U	0.190	0.190		0.203	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Cesium-137	-0.005535	U	0.0687	0.0687	0.0700	0.0387	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Lead-210	-1.521	U	2.11	2.12		1.81	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Lead-212	0.005502	U	0.107	0.107		0.0876	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Lead-214	-0.08636	U	0.192	0.193		0.147	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Potassium-40	0.3126	U	0.611	0.612		0.424	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Protactinium-231	-1.133	U	4.20	4.20		3.42	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Protactinium-234	0.04721	U	0.191	0.191		0.251	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Radium-226	-0.06406	U	0.190	0.190	0.200	0.203	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Radium-228	0.1584		0.120	0.121		0.0480	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Thallium-208	0.03896	U	0.0360	0.0363		0.0547	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Thorium 228	0.005502	U	0.107	0.107		0.0876	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Thorium-232	0.1584		0.120	0.121		0.0480	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Thorium-234	-1.226	U	0.929	0.941		0.986	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Uranium-235	0.1090	U	0.221	0.221		0.429	pCi/g	11/24/20 16:52	12/15/20 10:54	1
Uranium-238	-1.226	U	0.929	0.941		0.986	pCi/g	11/24/20 16:52	12/15/20 10:54	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID: LCS 160-490116/2-A**  
**Matrix: Solid**  
**Analysis Batch: 491754**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 490116**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	92.92		9.74		0.467	pCi/g	96	87 - 116	
Cesium-137	26.7	25.62		2.72	0.0700	0.0853	pCi/g	96	87 - 120	
Cobalt-60	9.46	8.667		0.912		0.0389	pCi/g	92	87 - 115	

**Lab Sample ID: 160-40480-6 DU**  
**Matrix: Solid**  
**Analysis Batch: 491756**

**Client Sample ID: HPPG-SFU-TU099A-004**  
**Prep Type: Total/NA**  
**Prep Batch: 490116**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
Actinium 228	0.338		0.2259		0.196		0.0788	pCi/g	0.29	1
Actinium-227	0.102	U	0.03064	U	0.286		0.301	pCi/g	0.12	1
Bismuth-212	-0.0455	U	0.02183	U	0.651		0.534	pCi/g	0.05	1
Bismuth-214	0.282		0.3198		0.108		0.0412	pCi/g	0.18	1
Cesium-137	0.0248	U	0.02775	U	0.0502	0.0700	0.0379	pCi/g	0.03	1
Lead-210	0.241	U	-0.3838	U	1.34		1.12	pCi/g	0.25	1
Lead-212	0.259		0.2995		0.0913		0.0453	pCi/g	0.24	1
Lead-214	0.379		0.2832		0.113		0.0478	pCi/g	0.43	1
Potassium-40	4.89		7.331		1.52		0.243	pCi/g	0.81	1
Protactinium-231	-0.785	U	0.0000	U	0.766		2.08	pCi/g	0.23	1
Protactinium-234	0.0245	U	0.1613	U	0.0849		0.228	pCi/g	1.04	1
Radium-226	0.282		0.3198		0.108	0.200	0.0412	pCi/g	0.18	1
Radium-228	0.338		0.2259		0.196		0.0788	pCi/g	0.29	1
Thallium-208	0.137		0.1018		0.0503		0.0209	pCi/g	0.30	1
Thorium 228	0.259		0.2995		0.0913		0.0453	pCi/g	0.24	1
Thorium-232	0.338		0.2259		0.196		0.0788	pCi/g	0.29	1
Thorium-234	-0.889	U	-0.4151	U	0.626		0.883	pCi/g	0.42	1
Uranium-235	-0.184	U	-0.00735	U	0.0806		0.426	pCi/g	0.51	1
			6							
Uranium-238	-0.889	U	-0.4151	U	0.626		0.883	pCi/g	0.42	1

**Lab Sample ID: MB 160-490251/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491974**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 490251**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	-0.03597	U	0.172	0.172		0.0883	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Actinium-227	0.03931	U	0.411	0.411		0.242	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Bismuth-212	-0.01937	U	0.627	0.627		0.515	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Bismuth-214	0.06141	U	0.0409	0.0414		0.0994	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Cesium-137	0.01744	U	0.0370	0.0370	0.0700	0.0279	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Lead-210	0.3174	U	0.607	0.608		0.459	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Lead-212	-0.01690	U	0.0232	0.0233		0.0609	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Lead-214	-0.1053	U	0.0728	0.0736		0.0768	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Potassium-40	-0.1420	U	0.809	0.809		0.382	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Protactinium-231	0.0000	U	0.429	0.429		1.77	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Protactinium-234	0.02212	U	0.0198	0.0199		0.189	pCi/g	11/25/20 12:41	12/16/20 09:13	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID: MB 160-490251/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491974**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 490251**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-226	0.06141	U	0.0409	0.0414	0.200	0.0994	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Radium-228	-0.03597	U	0.172	0.172		0.0883	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thallium-208	-0.02237	U	0.0311	0.0311		0.0361	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thorium 228	-0.01690	U	0.0232	0.0233		0.0609	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thorium-232	-0.03597	U	0.172	0.172		0.0883	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thorium-234	0.0000	U	0.196	0.196		0.526	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Uranium-235	0.1380	U	0.255	0.255		0.290	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Uranium-238	0.0000	U	0.196	0.196		0.526	pCi/g	11/25/20 12:41	12/16/20 09:13	1

**Lab Sample ID: LCS 160-490251/2-A**  
**Matrix: Solid**  
**Analysis Batch: 491973**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 490251**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec Limits
				Uncert. (2σ+/-)					
Americium-241	96.4	99.40		11.7		0.609	pCi/g	103	87 - 116
Cesium-137	26.7	30.20		3.17	0.0700	0.105	pCi/g	113	87 - 120
Cobalt-60	9.46	10.09		1.07		0.0489	pCi/g	107	87 - 115

**Lab Sample ID: 160-40480-25 DU**  
**Matrix: Solid**  
**Analysis Batch: 491979**

**Client Sample ID: HPPG-SFU-TU099A-023**  
**Prep Type: Total/NA**  
**Prep Batch: 490251**

Analyte	Sample Result	Sample Qual	DU	DU	Total	LOQ	DLC	Unit	RER	RER
			Result	Qual	Uncert. (2σ+/-)					Limit
Actinium 228	0.247		0.3346		0.199		0.114	pCi/g	0.29	1
Actinium-227	-0.273	U	-0.2879	U	0.619		0.371	pCi/g	0.02	1
Bismuth-212	-0.0582	U	0.2404	U	0.908		0.725	pCi/g	0.21	1
Bismuth-214	0.273		0.2201		0.127		0.0721	pCi/g	0.23	1
Cesium-137	-0.0153	U	-0.03854	U	0.0481	0.0700	0.0601	pCi/g	0.23	1
Lead-210	-0.623	U	-0.06750	U	1.37		0.970	pCi/g	0.20	1
Lead-212	0.240		0.2640		0.0818		0.0347	pCi/g	0.16	1
Lead-214	0.238		0.2630		0.120		0.0637	pCi/g	0.12	1
Potassium-40	7.97		6.688		1.52		0.255	pCi/g	0.45	1
Protactinium-231	0.000	U	0.0000	U	0.576		1.65	pCi/g	0	1
Protactinium-234	-0.0150	U	-0.07758	U	0.201		0.162	pCi/g	0.16	1
Radium-226	0.273		0.2201		0.127	0.200	0.0721	pCi/g	0.23	1
Radium-228	0.247		0.3346		0.199		0.114	pCi/g	0.29	1
Thallium-208	0.0845		0.1565		0.0550		0.0142	pCi/g	0.77	1
Thorium 228	0.240		0.2640		0.0818		0.0347	pCi/g	0.16	1
Thorium-232	0.247		0.3346		0.199		0.114	pCi/g	0.29	1
Thorium-234	0.000	U	0.7243		0.494		0.309	pCi/g	0.90	1
Uranium-235	0.0824	U	0.02370	U	0.140		0.245	pCi/g	0.14	1
Uranium-238	0.000	U	0.7243		0.494		0.309	pCi/g	0.90	1

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID: MB 160-490262/22-A**  
**Matrix: Solid**  
**Analysis Batch: 491973**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 490262**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.1347		0.0898	0.0908		0.0408	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Actinium-227	-0.3480	U	0.670	0.671		0.399	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Bismuth-212	-0.4194	U	0.861	0.862		0.662	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Bismuth-214	-0.08212	U	0.166	0.166		0.185	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Cesium-137	0.001577	U	0.0533	0.0533	0.0700	0.0436	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Lead-210	1.537		1.65	1.66		1.05	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Lead-212	-0.03723	U	0.0999	0.100		0.0984	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Lead-214	-0.01187	U	0.118	0.118		0.0969	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Potassium-40	-0.5436	U	1.44	1.45		0.672	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Protactinium-231	0.0000	U	0.581	0.581		1.97	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Protactinium-234	0.1213	U	0.214	0.214		0.200	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Radium-226	-0.08212	U	0.166	0.166	0.200	0.185	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Radium-228	0.1347		0.0898	0.0908		0.0408	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Thallium-208	0.07618		0.0513	0.0519		0.0365	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Thorium 228	-0.03723	U	0.0999	0.100		0.0984	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Thorium-232	0.1347		0.0898	0.0908		0.0408	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Thorium-234	-0.8566	U	0.875	0.881		0.741	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Uranium-235	0.1123	U	0.227	0.227		0.343	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Uranium-238	-0.8566	U	0.875	0.881		0.741	pCi/g	11/25/20 14:07	12/16/20 08:34	1

**Lab Sample ID: LCS 160-490262/23-A**  
**Matrix: Solid**  
**Analysis Batch: 491975**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 490262**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Americium-241	96.4	94.33		9.90		0.520	pCi/g	98	87 - 116
Cesium-137	26.7	25.48		2.71	0.0700	0.0730	pCi/g	95	87 - 120
Cobalt-60	9.46	9.003		0.946		0.00975	pCi/g	95	87 - 115

# QC Association Summary

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

## Rad

### Leach Batch: 489763

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40480-1	HPPG-F-037	Total/NA	Solid	Dry and Grind	
160-40480-2	HPPG-F-038	Total/NA	Solid	Dry and Grind	

### Leach Batch: 489830

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40480-3	HPPG-SFU-TU099A-001	Total/NA	Solid	Dry and Grind	
160-40480-4	HPPG-SFU-TU099A-002	Total/NA	Solid	Dry and Grind	
160-40480-5	HPPG-SFU-TU099A-003	Total/NA	Solid	Dry and Grind	
160-40480-6	HPPG-SFU-TU099A-004	Total/NA	Solid	Dry and Grind	
160-40480-7	HPPG-SFU-TU099A-005	Total/NA	Solid	Dry and Grind	
160-40480-8	HPPG-SFU-TU099A-006	Total/NA	Solid	Dry and Grind	
160-40480-9	HPPG-SFU-TU099A-007	Total/NA	Solid	Dry and Grind	
160-40480-10	HPPG-SFU-TU099A-008	Total/NA	Solid	Dry and Grind	
160-40480-11	HPPG-SFU-TU099A-009	Total/NA	Solid	Dry and Grind	
160-40480-12	HPPG-SFU-TU099A-010	Total/NA	Solid	Dry and Grind	
160-40480-13	HPPG-SFU-TU099A-011	Total/NA	Solid	Dry and Grind	
160-40480-14	HPPG-SFU-TU099A-012	Total/NA	Solid	Dry and Grind	
160-40480-15	HPPG-SFU-TU099A-013	Total/NA	Solid	Dry and Grind	
160-40480-16	HPPG-SFU-TU099A-014	Total/NA	Solid	Dry and Grind	
160-40480-17	HPPG-SFU-TU099A-015	Total/NA	Solid	Dry and Grind	
160-40480-18	HPPG-SFU-TU099A-016	Total/NA	Solid	Dry and Grind	
160-40480-19	HPPG-SFU-TU099A-017	Total/NA	Solid	Dry and Grind	
160-40480-20	HPPG-SFU-TU099A-018	Total/NA	Solid	Dry and Grind	
160-40480-21	HPPG-SFU-TU099A-019	Total/NA	Solid	Dry and Grind	
160-40480-22	HPPG-SFU-TU099A-020	Total/NA	Solid	Dry and Grind	
160-40480-23	HPPG-SFU-TU099A-021	Total/NA	Solid	Dry and Grind	
160-40480-24	HPPG-SFU-TU099A-022	Total/NA	Solid	Dry and Grind	
160-40480-25	HPPG-SFU-TU099A-023	Total/NA	Solid	Dry and Grind	
160-40480-26	HPPG-SFU-TU099A-024	Total/NA	Solid	Dry and Grind	
160-40480-6 DU	HPPG-SFU-TU099A-004	Total/NA	Solid	Dry and Grind	
160-40480-25 DU	HPPG-SFU-TU099A-023	Total/NA	Solid	Dry and Grind	

### Leach Batch: 489837

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40480-27	HPPG-SFU-TU099A-025	Total/NA	Solid	Dry and Grind	

### Prep Batch: 490116

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40480-1	HPPG-F-037	Total/NA	Solid	Fill_Geo-21	489763
160-40480-2	HPPG-F-038	Total/NA	Solid	Fill_Geo-21	489763
160-40480-3	HPPG-SFU-TU099A-001	Total/NA	Solid	Fill_Geo-21	489830
160-40480-4	HPPG-SFU-TU099A-002	Total/NA	Solid	Fill_Geo-21	489830
160-40480-5	HPPG-SFU-TU099A-003	Total/NA	Solid	Fill_Geo-21	489830
160-40480-6	HPPG-SFU-TU099A-004	Total/NA	Solid	Fill_Geo-21	489830
MB 160-490116/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490116/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40480-6 DU	HPPG-SFU-TU099A-004	Total/NA	Solid	Fill_Geo-21	489830

### Prep Batch: 490251

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40480-7	HPPG-SFU-TU099A-005	Total/NA	Solid	Fill_Geo-21	489830

# QC Association Summary

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
 SDG: GJ46599768

## Rad (Continued)

### Prep Batch: 490251 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40480-8	HPPG-SFU-TU099A-006	Total/NA	Solid	Fill_Geo-21	489830
160-40480-9	HPPG-SFU-TU099A-007	Total/NA	Solid	Fill_Geo-21	489830
160-40480-10	HPPG-SFU-TU099A-008	Total/NA	Solid	Fill_Geo-21	489830
160-40480-11	HPPG-SFU-TU099A-009	Total/NA	Solid	Fill_Geo-21	489830
160-40480-12	HPPG-SFU-TU099A-010	Total/NA	Solid	Fill_Geo-21	489830
160-40480-13	HPPG-SFU-TU099A-011	Total/NA	Solid	Fill_Geo-21	489830
160-40480-14	HPPG-SFU-TU099A-012	Total/NA	Solid	Fill_Geo-21	489830
160-40480-15	HPPG-SFU-TU099A-013	Total/NA	Solid	Fill_Geo-21	489830
160-40480-16	HPPG-SFU-TU099A-014	Total/NA	Solid	Fill_Geo-21	489830
160-40480-17	HPPG-SFU-TU099A-015	Total/NA	Solid	Fill_Geo-21	489830
160-40480-18	HPPG-SFU-TU099A-016	Total/NA	Solid	Fill_Geo-21	489830
160-40480-19	HPPG-SFU-TU099A-017	Total/NA	Solid	Fill_Geo-21	489830
160-40480-20	HPPG-SFU-TU099A-018	Total/NA	Solid	Fill_Geo-21	489830
160-40480-21	HPPG-SFU-TU099A-019	Total/NA	Solid	Fill_Geo-21	489830
160-40480-22	HPPG-SFU-TU099A-020	Total/NA	Solid	Fill_Geo-21	489830
160-40480-23	HPPG-SFU-TU099A-021	Total/NA	Solid	Fill_Geo-21	489830
160-40480-24	HPPG-SFU-TU099A-022	Total/NA	Solid	Fill_Geo-21	489830
160-40480-25	HPPG-SFU-TU099A-023	Total/NA	Solid	Fill_Geo-21	489830
MB 160-490251/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490251/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40480-25 DU	HPPG-SFU-TU099A-023	Total/NA	Solid	Fill_Geo-21	489830

### Prep Batch: 490262

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40480-26	HPPG-SFU-TU099A-024	Total/NA	Solid	Fill_Geo-21	489830
160-40480-27	HPPG-SFU-TU099A-025	Total/NA	Solid	Fill_Geo-21	489837
MB 160-490262/22-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490262/23-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

### Prep Batch: 490603

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40480-3	HPPG-SFU-TU099A-001	Total/NA	Solid	DPS-7	489830
160-40480-13	HPPG-SFU-TU099A-011	Total/NA	Solid	DPS-7	489830
160-40480-23	HPPG-SFU-TU099A-021	Total/NA	Solid	DPS-7	489830
MB 160-490603/21-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-490603/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

# Tracer/Carrier Summary

Page 84 of 100

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40480-1  
SDG: GJ46599768

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

## Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40480-3	HPPG-SFU-TU099A-001	103	95.0
160-40480-13	HPPG-SFU-TU099A-011	102	90.5
160-40480-23	HPPG-SFU-TU099A-021	101	91.2
LCS 160-490603/1-A	Lab Control Sample	107	90.8
MB 160-490603/21-A	Method Blank	83.7	87.1

### Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier



Environment Testing  
America

# ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40514-1  
Laboratory Sample Delivery Group: D1189460  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 1

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

Authorized for release by:  
4/12/2021 3:36:52 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

### LINKS

Review your project  
results through  
**Total Access**

Have a Question?

**Ask  
The  
Expert**

Visit us at:  
[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



# Table of Contents

Cover Page . . . . .	1
Table of Contents . . . . .	2
Case Narrative . . . . .	3
Chain of Custody . . . . .	6
Receipt Checklists . . . . .	8
Definitions/Glossary . . . . .	9
Method Summary . . . . .	10
Sample Summary . . . . .	11
Client Sample Results . . . . .	12
QC Sample Results . . . . .	13
QC Association Summary . . . . .	15
Tracer Carrier Summary . . . . .	16



# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40514-1  
SDG: D1189460

**Job ID: 160-40514-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

**Narrative**

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40514-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40514-1  
SDG: D1189460

## Job ID: 160-40514-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 11/21/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 16.8 C.

#### STRONTIUM-90 (GFPC)

Sample HPPG-SFU-TU099A-B-001 (160-40514-1) was analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/23/2020, prepared on 12/01/2020 and analyzed on 12/10/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-SFU-TU099A-B-001 (160-40514-1).

The method blank (MB) z-score associated with Prep Batch 160-490603 is within limits and is stored in the level IV raw data. (MB 160-490603/21-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-SFU-TU099A-B-001 (160-40514-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 11/23/2020, prepared on 11/25/2020 and analyzed on 12/16/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The method blank (MB) z-score associated with Prep Batch 160-490262 is within limits and is stored in the level IV raw data. (MB 160-490262/22-A)

The replicate precision for Bi-214/Ra-226 associated with Prep Batch 160-489993 and 160-490262 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40531-A-16-C DU)

# Case Narrative

Page 89 of 100

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40514-1  
SDG: D1189460

---

**Job ID: 160-40514-1 (Continued)**

---

**Laboratory: Eurofins TestAmerica, St. Louis (Continued)**

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Murri, Andrew

Sample Tech(s):

# CHAIN OF CUSTODY

Ref. Document # 501197RSY-037

Project Number: 501197  
 Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
 Project Location: San Francisco, CA  
 Purchase Order #: 1159058  
 Shipment/Pickup Date: 11/20/2020  
 Waybill Number: 4957 0225 6295  
 Lab Destination: Test America (St. Louis Lab)  
 13715 Rider Trail North  
 Earth City, MO 63046  
 Lab Contact Name/ph #: Rhonda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Analysis Requested						Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method						Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)							
HPPG-SFU-TU099A-B-001	11/19/2020	16:25	G	SO	1	16 oz. plastic jar	X		X						5	D1189460	

Special Instructions:

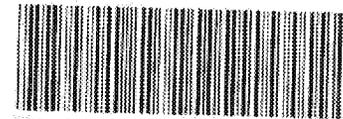
21 day ingrowth results only

Turnaround Time: 3-day  10-Day  28-day  Other  Level of QC Required: I  II  III  Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew		11/19/2020 17:16	Locked Storage (RKillpack)		11/19/2020 17:16
Locked Storage (RKillpack)		11/20/2020 13:32	Devin Lewis		11/20/2020 13:32
Devin Lewis		11/20/2020 13:34	SHIPPEDTOLAB		11/21/20 08:26

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*

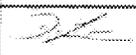


160-40514 Chain of Custody

*ph*



# All Transfers for COC 501197RSY-037

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew		11/19/2020 17:15	Locked Storage (RKillpack)		11/19/2020 17:15
Locked Storage (RKillpack)		11/20/2020 13:32	Devin Lewis		11/20/2020 13:32
Devin Lewis		11/20/2020 13:34	SHIPPEDTOLAB		11/21/20 09:26





## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40514-1

SDG Number: D1189460

**Login Number: 40514****List Number: 1****Creator: Greer, Diane A****List Source: Eurofins TestAmerica, St. Louis**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40514-1  
SDG: D1189460

## Qualifiers

### Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40514-1  
SDG: D1189460

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

**Protocol References:**

- DOE = U.S. Department of Energy
- EPA = US Environmental Protection Agency
- None = None

**Laboratory References:**

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Sample Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40514-1  
SDG: D1189460

---

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40514-1	HPPG-SFU-TU099A-B-001	Solid	11/19/20 16:25	11/21/20 08:26	

---



# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40514-1  
 SDG: D1189460

**Client Sample ID: HPPG-SFU-TU099A-B-001**

**Lab Sample ID: 160-40514-1**

Date Collected: 11/19/20 16:25

Matrix: Solid

Date Received: 11/21/20 08:26

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	0.233		0.153	0.154	0.331	0.108	pCi/g	12/01/20 10:36	12/10/20 17:32	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	102		40 - 110					12/01/20 10:36	12/10/20 17:32	1
Y Carrier	93.5		40 - 110					12/01/20 10:36	12/10/20 17:32	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.462		0.127	0.136		0.0957	pCi/g	11/25/20 14:07	12/16/20 06:46	1
Actinium-227	0.155	U	0.289	0.290		0.233	pCi/g	11/25/20 14:07	12/16/20 06:46	1
Bismuth-212	-0.233	U	0.644	0.644		0.512	pCi/g	11/25/20 14:07	12/16/20 06:46	1
<b>Bismuth-214</b>	<b>0.265</b>		0.0969	0.101		0.0478	pCi/g	11/25/20 14:07	12/16/20 06:46	1
Cesium-137	-0.0378	U	0.0587	0.0588	0.0700	0.0457	pCi/g	11/25/20 14:07	12/16/20 06:46	1
Lead-210	-0.720	U	1.55	1.56		1.25	pCi/g	11/25/20 14:07	12/16/20 06:46	1
<b>Lead-212</b>	<b>0.446</b>		0.0787	0.0976		0.0370	pCi/g	11/25/20 14:07	12/16/20 06:46	1
<b>Lead-214</b>	<b>0.373</b>		0.0784	0.0875		0.0436	pCi/g	11/25/20 14:07	12/16/20 06:46	1
<b>Potassium-40</b>	<b>7.91</b>		1.07	1.34		0.0845	pCi/g	11/25/20 14:07	12/16/20 06:46	1
Protactinium-231	0.288	U	1.08	1.08		1.70	pCi/g	11/25/20 14:07	12/16/20 06:46	1
Protactinium-234	-0.0293	U	0.0642	0.0643		0.192	pCi/g	11/25/20 14:07	12/16/20 06:46	1
<b>Radium-226</b>	<b>0.265</b>		0.0969	0.101	0.200	0.0478	pCi/g	11/25/20 14:07	12/16/20 06:46	1
<b>Radium-228</b>	<b>0.462</b>		0.127	0.136		0.0957	pCi/g	11/25/20 14:07	12/16/20 06:46	1
<b>Thallium-208</b>	<b>0.185</b>		0.0446	0.0485		0.00980	pCi/g	11/25/20 14:07	12/16/20 06:46	1
<b>Thorium 228</b>	<b>0.446</b>		0.0787	0.0976		0.0370	pCi/g	11/25/20 14:07	12/16/20 06:46	1
<b>Thorium-232</b>	<b>0.462</b>		0.127	0.136		0.0957	pCi/g	11/25/20 14:07	12/16/20 06:46	1
<b>Thorium-234</b>	<b>0.691</b>		0.359	0.367		0.268	pCi/g	11/25/20 14:07	12/16/20 06:46	1
Uranium-235	0.000	U	0.136	0.136		0.339	pCi/g	11/25/20 14:07	12/16/20 06:46	1
<b>Uranium-238</b>	<b>0.691</b>		0.359	0.367		0.268	pCi/g	11/25/20 14:07	12/16/20 06:46	1

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40514-1  
 SDG: D1189460

## Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-490603/21-A  
 Matrix: Solid  
 Analysis Batch: 491401

Client Sample ID: Method Blank  
 Prep Type: Total/NA  
 Prep Batch: 490603

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.1284	U	0.224	0.224	0.331	0.175	pCi/g	12/01/20 10:36	12/10/20 17:33	1
Carrier	MB MB		Limits				Prepared		Analyzed	Dil Fac
Sr Carrier	%Yield	Qualifier								
	83.7		40 - 110				12/01/20 10:36		12/10/20 17:33	1
Y Carrier	87.1		40 - 110				12/01/20 10:36		12/10/20 17:33	1

Lab Sample ID: LCS 160-490603/1-A  
 Matrix: Solid  
 Analysis Batch: 491432

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 490603

Analyte	LCS LCS		Spike	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
	%Yield	Qualifier	Added	Result	Qual	Uncert. (2σ+/-)					
Strontium-90			7.76	6.228		0.666	0.331	0.106	pCi/g	80	75 - 125
Carrier	LCS LCS		Limits								
Sr Carrier	%Yield	Qualifier									
	107		40 - 110								
Y Carrier	90.8		40 - 110								

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-490262/22-A  
 Matrix: Solid  
 Analysis Batch: 491973

Client Sample ID: Method Blank  
 Prep Type: Total/NA  
 Prep Batch: 490262

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.1347		0.0898	0.0908		0.0408	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Actinium-227	-0.3480	U	0.670	0.671		0.399	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Bismuth-212	-0.4194	U	0.861	0.862		0.662	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Bismuth-214	-0.08212	U	0.166	0.166		0.185	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Cesium-137	0.001577	U	0.0533	0.0533	0.0700	0.0436	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Lead-210	1.537		1.65	1.66		1.05	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Lead-212	-0.03723	U	0.0999	0.100		0.0984	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Lead-214	-0.01187	U	0.118	0.118		0.0969	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Potassium-40	-0.5436	U	1.44	1.45		0.672	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Protactinium-231	0.0000	U	0.581	0.581		1.97	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Protactinium-234	0.1213	U	0.214	0.214		0.200	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Radium-226	-0.08212	U	0.166	0.166	0.200	0.185	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Radium-228	0.1347		0.0898	0.0908		0.0408	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Thallium-208	0.07618		0.0513	0.0519		0.0365	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Thorium 228	-0.03723	U	0.0999	0.100		0.0984	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Thorium-232	0.1347		0.0898	0.0908		0.0408	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Thorium-234	-0.8566	U	0.875	0.881		0.741	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Uranium-235	0.1123	U	0.227	0.227		0.343	pCi/g	11/25/20 14:07	12/16/20 08:34	1
Uranium-238	-0.8566	U	0.875	0.881		0.741	pCi/g	11/25/20 14:07	12/16/20 08:34	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40514-1  
 SDG: D1189460

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

**Lab Sample ID: LCS 160-490262/23-A**  
**Matrix: Solid**  
**Analysis Batch: 491975**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 490262**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec.
									Limits
Americium-241	96.4	94.33		9.90		0.520	pCi/g	98	87 - 116
Cesium-137	26.7	25.48		2.71	0.0700	0.0730	pCi/g	95	87 - 120
Cobalt-60	9.46	9.003		0.946		0.00975	pCi/g	95	87 - 115

# QC Association Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40514-1  
SDG: D1189460

## Rad

### Leach Batch: 489993

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40514-1	HPPG-SFU-TU099A-B-001	Total/NA	Solid	Dry and Grind	

### Prep Batch: 490262

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40514-1	HPPG-SFU-TU099A-B-001	Total/NA	Solid	Fill_Geo-21	489993
MB 160-490262/22-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490262/23-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

### Prep Batch: 490603

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40514-1	HPPG-SFU-TU099A-B-001	Total/NA	Solid	DPS-7	489993
MB 160-490603/21-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-490603/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

# Tracer/Carrier Summary

Page 100 of 100

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40514-1  
SDG: D1189460

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

## Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40514-1	HPPG-SFU-TU099A-B-001	102	93.5
LCS 160-490603/1-A	Lab Control Sample	107	90.8
MB 160-490603/21-A	Method Blank	83.7	87.1

### Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier